

COAL AGE

A McGRAW-HILL PUBLICATION

FEBRUARY, 1959

- ABC's of Ventilation p 96
- Highwall Mining p 104
- Cleaning Coking Coal p 112

PRICE \$1



Coal in Review . . . pp 74 - 90

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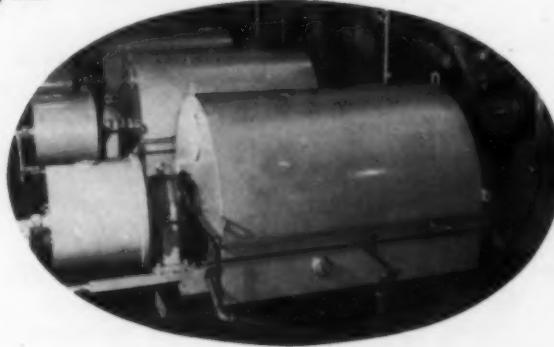
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This Month in FEBRUARY 1959

COAL AGE

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► Coal Outlook

Recovery Spurs Coal Gains in '59 p 74

Bituminous experienced its second worst postwar year in 1958 with output falling to an estimated 400 million tons, or 90 million tons less than in 1957. Anthracite dropped from 25 to 21.5 million tons—the lowest annual commercial production since 1875. Recovery in the Nation's economy, now firmly set, should mean a rebound for bituminous to 450 to 460 million tons. Sparking the pickup will be higher consumption by the steel and electric utility industries, plus buildup of depleted stockpiles. Hard coal is expected to hold to last year's level of 21.5 million tons. Gains in commercial tonnage are a good bet but these will probably be offset by further losses in domestic sales. Bituminous still takes top billing in opportunities for long-range growth.

Featured—Anthracite Roundup; top 15 bituminous producers in 1958.

► Technical Developments

Mining, Stripping, Preparation in 1958 p 80

Deep Mining—Steps toward remote control and automation of face operations mark recent developments.

Stripping—Bigger, faster overburden drills and mechanical handling of blasting agents in charging

horizontal and vertical blastholes are highlights.

Preparation—New and improved equipment and greater emphasis on fully-automatic control are top 1958 developments.

Highlight—Complete listing of preparation equipment installations by company, capacity and type.

► Safety, Equipment Sales

Safety in 1958	p 86
1958 Sales of Mining Equipment	p 90
W. H. Young, R. L. Anderson, USBM	

Improved performance as reflected in injury and fatality rates marked 1958 safety achievement, although disasters still plagued the industry.

Sales of equipment reflect strong trends toward more continuous mining and mechanical cleaning.

► Ventilation

The ABC's of Ventilation for Continuous Miners p 96

Steady-rate emissions of up to 200 cfm or more, with 20 to 50 cfm fairly common, are the major problem in face ventilation for continuous miners. Secondary problems are continued bleeding from ribs into working areas, and float dust. Brattice lines with narrow-side intake effective even with boring-type units if gas liberation is not too great. With wide-side intaking velocity is reduced and thus clearing of the face is more difficult, though done successfully at some operations using ripper-type equipment. For higher rates the best answer now appears to be blowers or exhausters and tubing, alone or with brattice.

Added Attraction—Plans for ventilating without hauling through curtains, checks or doors.

► Continuous Mining

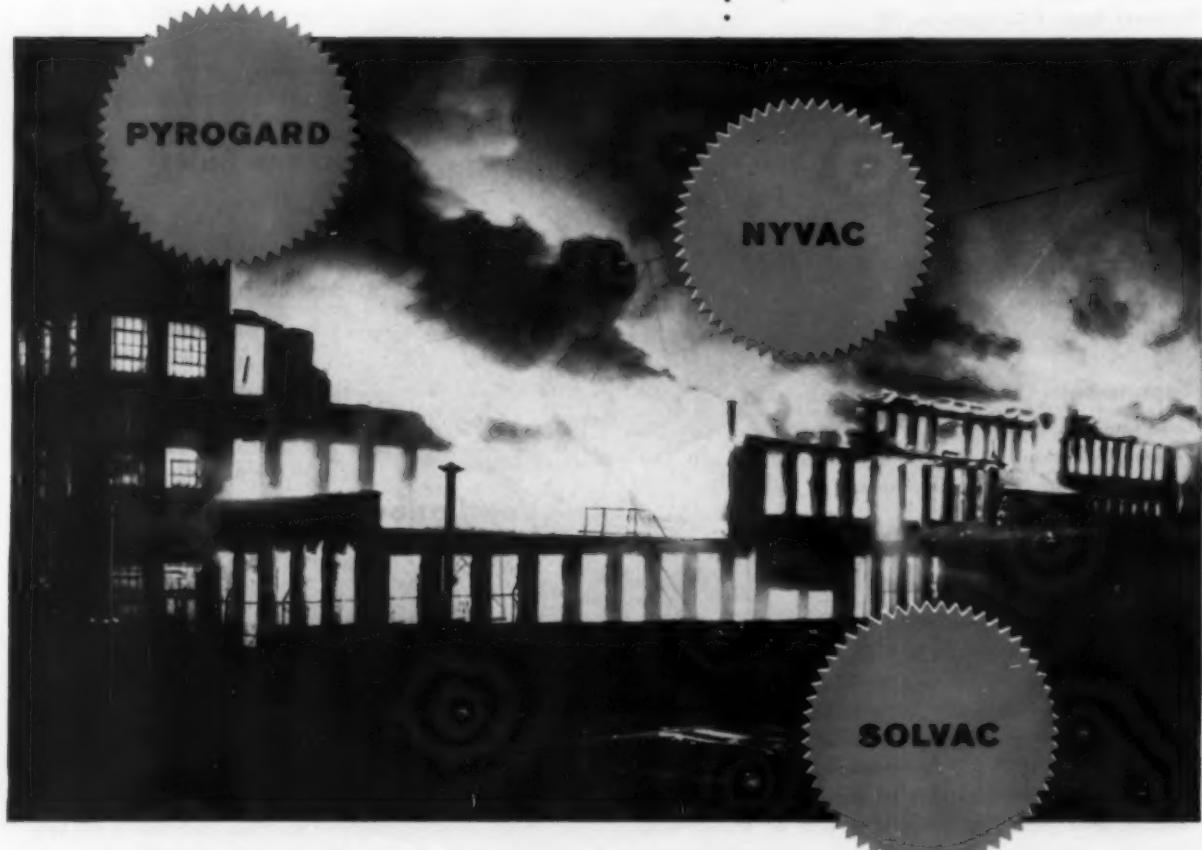
Low-Cost Highwall Mining p 104

A. D. Henry, General Superintendent, Strip Mines, Powhatan Mining Co., Bloomingdale, Ohio.

A productivity rate of 34 tons per man shift is

New Low-Cost Fire Protection

Protect your personnel, property, production—with a Mobil Fire-Resistant fluid that exactly meets your needs!



If any of your hydraulic systems operate near a source of ignition you're in need of a fire-resistant fluid. There are three types to choose from: Straight Synthetic, Water Base Synthetics and Emulsions of Water and Oil. With the introduction of Pyrogard, Nyvac and Solvac . . . now Mobil can supply you with *all three types*.

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This Month in Coal Age—Cont'd

the record of performance in applying a boring-type machine and an extensible belt to room-panel recovery under final highwall. Average depth of rooms now is 471 ft. Recovery in the Pittsburgh No. 8 seam is near 5,000 tons per acre. Face labor cost is 70.3c per ton and bit cost is 4.7c per ton.

Top Interest—Diagrams of mining methods and minimum roof-support standards; productivity charts.

► Coal Preparation

Improving Coking Coal Quality p 112

R. M. von Storch, General Superintendent, Coal Mines and Quarries, Columbia-Geneva Steel Div., United States Steel Corp., Dragerton, Utah.

U. S. Steel's new 600 tph coal cleaning facility at Wellington, Utah, is designed to upgrade for coke the high-volatile coals from Utah by blending with medium- and low-volatile coals from Colorado, Oklahoma and Arkansas. The design of the plant is based upon large-scale washability tests conducted at U. S. Steel's Corbin, Ky. plant. A feature of the plant is electronic weighing and proportioning of the raw coal. Coarse coal is cleaned in a Chance cone. Fine coal is washed on 18 Deister tables.

Of Prime Interest—A description of a carbonization laboratory at Geneva in which tests have indicated the feasibility of mining coal which was thought to be of extremely low coking quality.

► Transportation

Pushbutton-Controlled Retarders for Railroad Cars p 118

Automatic loading and weighing of 720 tph of clean coal is achieved through the use of electronic-pneumatic car retarders at U. S. Steel's Corbin, Ky. plant. Two of the car retarders control the railroad cars during the loading operation and two others control the weighing operation. The retarders are controlled by the loading chute operator and by the scale man.

For Your Information—Detailed description of retarder in operation.

► Stripping

The Kopuku Story p 122

To fuel new 180,000-kw power plant in New Zealand, Kopuku mine at Maramarua is being developed to 6,000,000-tons-per-year level. Seam being exploited is 50 ft thick and maximum depth of cover is 388 ft. Overburden is benched and is removed by ripping and scraping. In the initial stages the scrapers haul to disposal sites outside the pit area; after coal loading begins spoil will be backfilled.

This Month in **COAL**

MODEST START—Having succeeded in piercing the 9-million ceiling only once in 1958, with 9,025,000 tons in the week ended Dec. 13, bituminous coal registered a modest increase in rate in January and began to get set for 25 to 30 million or more additional tons in the first half of 1959, compared to first-half 1958. Even if the rate in first-half 1959 turned out to be no greater than the last quarter of '58, the industry should do at least that well, since this rate is a million or more a week above the average in the first 6 mo of last year. So bituminous has good prospects of reaching 450 to 455 million or more for the entire year.

BOOST FROM BOREAS—One of the coldest Decembers on record, with more of the same in early January, got anthracite off to a flying start in 1959. Even without this added boost the industry had been averaging higher in the last half of 1958 than in the first, meaning that it was entering 1959 in a stronger position and thus more ready to take advantage of any comeback in utility and other demands, including export. With a continued break from the weather, therefore, anthracite has the possibility, for the first time in a number of years, of equaling the previous year's output.

ANOTHER STEP—One of the big plums in the fuel market is gasoline, diesel and kindred fuels. It is a plum that coal can look forward to picking at some future date—not necessarily soon but perhaps sooner than might be thought. The date depends on the prices of conventional liquid fuels, their availability and, among other things, the time, money and talent poured into developing efficient low-cost processes for converting coal. The end of 1958 brought a new recruit to the ranks as a result of a joint agreement between Consol, already in the field, and Standard Oil of Ohio. In all probability the list of oil companies and others taking this step will grow, and with it the probability of a successful competitive conversion process.

Timing—“The research officials say at this time that it appears that 5 to 10 yr of research and development work will be required before the project will reach the point where consideration can be given to the commercial possibilities.”

WASHINGTON AND COMPETITION — When will nuclear power be competitive? If you take the latest word of the AEC and Joint Congressional Committee on Atomic Energy, it will be 1968. At least that was the goal announced early in January, followed immediately by the introduction of legislation to put the government more squarely in the development and construction field. With this move came others designed to ease the job of coal's competitors—at least in certain directions. A primary one, supplementing steps already taken to facilitate gas imports, was negotiations aimed at easing oil-import restrictions to permit Canada to increase her shipments. One result probably will be easing of restrictions all across the board in line with Democratic and Liberal Republican thinking.

MORE TO COME—In addition to mergers and purchases announced at the end of 1958 (see News Section), the informed betting is that there will be more and bigger ones in the first quarter or half.



CYANAMID

Explosives News

CYANAMID'S NEW CASTLE EXPLOSIVES PLANT INCREASES MANUFACTURING CAPACITY

In construction, mining and quarrying, the increased need for high quality industrial explosives continues to grow. To meet this demand, Cyanamid has recently completed a building and expansion program that includes a

new ammonium nitrate plant, as well as many new types of equipment, processes and other facilities. Shown here are a few photographs of the mighty 535-acre New Castle explosive manufacturing operations.



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1. One end of the tank battery, the refrigeration plant and storage facilities for glycerine and glycol. Partly hidden by trees (left center) is the gelatin line warehouse and gelatin line dope house.
2. The blasting agents building, where work is being done with an insensitive explosive. To detonate this mixture, a large priming charge of high explosives is required.
3. One of the large wooden chaser-mill type mixers in the dynamite

mix house. Here nitroglycerin and nitrocotton are mixed with the "dope" as it comes from the dope house for processing. After mixing, the explosive has been formed. As dynamite, it is taken by tram line to the pack houses.

4. Here packaged explosives are shown on their way by tram to the storage magazine.

Cyanamid customers can be assured of highest quality and unequalled nationwide service now and in the future.

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This Month in Coal Age—Cont'd

Swamp Hurdle—How causeway for aerial tramway was constructed through mud swamp to provide transportation to point to use.

► Strip Maintenance

Applying New Alloy Steel

For Lower Strip Maintenance p. 126

Andrew Hyslop, Chief Engineer, and D. S. Kleckner, Superintendent, Hanna Coal Co., Cadiz, Ohio.

Versatile, extraordinarily-high-strength steel finds variety of applications on shovels, including replacement of castings for higher strength, safety and long life. Single grade and type covers a wide range of uses. Abrasion resistance also results in such applications as chutes, flash-dryer stacks, fans in corrosive atmospheres, and cutter heads and pump impellers for dredges.

Picture-and-Caption Benefits—Actual pictures of how the new steel is used and what it provides in benefits.

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This Month in Mining Practice

STEADY ON—In British parlance, this means no major change in course, which is the picture at the present time for the next several months in deep mining. Even though, as an example, work is being done on servo, or remotely-controlled, miners and though they will be a major factor in underground mining in the future, the number in service is still quite limited. So there will be no surprises or major breakthroughs in deep mining in 1959—at least on the basis of indications so far. However, an increase of at least 1 ton per man—and perhaps more—can be confidently expected as a result of wider application of conventional continuous miners, the use of which, plus bigger, more-efficient stripping equipment, already has been accelerated by the last wage agreement.

New Partner—Conventional miners in the near fat re may be accompanied in some instances by such equipment as augers, with the miner driving rooms on wide centers and the auger taking out the pillar.

OPERATING AID—Multistory preparation plants pose problems of getting men and equipment and supplies up and down. One answer is an elevator, but unless the plant is designed for such a unit in the first place, the question becomes one of where to put it. One manufacturer now is prepared to add elevators on the outside. Whether designed into the plant originally or added on the outside afterward, the elevator can pay off in convenience and reduced downtime. A nice supplement is a supply room for small frequently used parts—and the tools to install them—in the plant itself.

BODY PROTECTOR—Abrasion and acid are two of the truck body's worst enemies. Can their effects be minimized or eliminated? One answer is a protective coating, and among possible coatings is a combination of epoxy resin and glass fiber. This coating can be applied by spraying, and, in fact, is being employed by some truckers outside the coal industry—and possibly in one or two instances in. Abrasion and corrosion, reports indicate, are almost completely eliminated. The cost is moderate and weight and capacity of the body are not appreciably affected.

SAFETY TRAILBLAZER—Illinois continues to set a hot pace in mine-safety improvement after a 1958 record of operation with no fatalities in the months of March, April, May, June, July and October. Nationally, bituminous cut its rate per million tons around .05. in 1958. If continued progress can be made in cutting roof-fall and explosion fatalities, as well as others, the industry rate should move downward still farther to .75 or less in 1959.

NONFLAMMABLE FLUIDS—Petroleum-base hydraulic fluids are reliable and economical, but they do have the disadvantage of being fairly easy to ignite. This has led to research into nonflammable types with equal or approximately equal characteristics and price. Though the candidates are several, few so far have passed the majority or all of the tests. But indications are that one or more will be available relatively soon.

coming and going *every*
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MINE PORTAL BUS

■ There's no wasted motion with this self-propelled Portal Bus because it is fast on the take-off, saving manpower time for conversion into more tonnage. And it is designed for safety, with hydraulic operated running brakes plus mechanical emergency and parking brakes direct on the wheels. For severe grades, op-

tional electric dynamic system produces braking effect from the motor for extra safety under all conditions. Also the split roof construction gives operator unimpeded, all directional view, while the trolley pole is always within quick reach. This bus is powered by 15 H.P. motor and will haul 13 to 17 men.

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MINE JITNEY

■ The Mine Jitney is the "Jack-of-all-Trades" of the mine fleet because its versatility enables it to be used on the regular job and for emergency. It can handle the job of furnishing fast, safe transportation of key personnel, maintenance crews and special groups; and can double up as an ambulance or fire-fighting equipment car. Designed with twin braking systems for added safety. Powered with either



5 or 7½ H.P. motor. Holds up to 7 men comfortably. Optional equipment: Plexiglas windshield, fire extinguisher, stretcher equipment.



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CHARLEROI, PENNSYLVANIA

SPECIALISTS IN COAL MINING EQUIPMENT

The Coal Commentator

Key Item

What is the No. 1 problem in mining today—aside, perhaps, from keeping the organization healthy on today's reduced tonnage? Mining men tell *Coal Age* that it is maintenance.

What, in turn, is the No. 1 problem in maintenance itself? All the evidence indicates that it is organization. Good organization reflects proper understanding of principles, thorough study of the job and a careful decision on the goals in downtime and labor and materials costs. With good organization achievements are easily compared with the established goals, the necessary manpower is made available, and the necessary facilities are provided for prevention, for economical repair when necessary and overhaul when required.

Organizations will differ with conditions and equipment, but each should be tailor-made for the job. The difference, in terms of downtime and the cost of maintenance itself, is not a matter of a few pennies. It can run to as much as \$1 a ton, and frequently to 25 to 50c.

First Step

Promotion, meaning spreading the word about the merits and uses of your product, is not an everytime road to results. And you have to be sure that the possibilities in business are worth the effort. Frequently they are, as recent anthracite experience again demonstrates.

The case in point is promotion to apartment-house owners through professional and real-estate publications. As a result, the Anthracite Information Bureau points out, a significant increase in requests for data on savings and other possibilities has been experienced, and more sales are in the offing.

Moral—Promotion pays. Telling the customer and the prospect is the first and vital step in making the sale.

Better Jobs

A little over 2 yr from now *Coal Age* will be marking the completion of its first 50 yr of service to coal mining. It, of course, is following in the wake of many other organizations.

The Alabama Mining Institute, for example, completed its half century of service to its members and the coal industry of Alabama last August. Some evidence of the effectiveness of its job—and the faith and works of its membership—may be gained from the fact that coal is definitely a growth industry in Alabama.

On the manufacturing side, the Harnischfeger Corp., of Milwaukee, formally celebrates this month

completion of its first 75 yr of operation Dec. 4. This 75 saw it grow from a small crane shop to a leading manufacturer of excavating and other equipment, and also saw it diversify into housing and other activities.

Service and service plus quality have been the keys in both instances.

Overseas Flashes

The McGraw-Hill News Bureau network, as well as the public prints of other countries, continue to bring news of new approaches to mining and transportation problems. For instance:

Red China is reported to be standardizing on hydraulic mining, popularized by the USSR and certain of its European satellites. Results? Big claims but no specific figures. In Russia itself, reports are that experiments are being carried on in mining by sonic or resonance means—again with no specific figures on results. And Russia also is reported to be operating so-called "high-frequency" electric locomotives in which there is no direct current connection, as between wire and pole. Instead power comes from a magnetic field around an overhead conductor carrying high-frequency current. Germany continues to develop pneumatic hoisting of coal out of shafts, and has come up with the amphibious barge, which can be pulled up onto a railway car for the overland stage of a joint water-rail haul.

Adding it all up, coal men abroad also are busy keeping their industries abreast of the times—and perhaps ahead.

Still Good

"Finsider companies are closely tied to the U. S. as a source of raw materials. The companies of Finsider buy about 85% of their coking coal from the U. S.," along with other raw materials, equipment and services.

Finsider is short for Societa Finanziaria Siderurgica, from whose latest brochure the preceding quotation was taken. This group of Italian producers has increased steel output from 1 million tons in 1950 to 3.8 million in 1957. In this same period, the Italian total rose from 2.6 to 7.5 million tons.

Coking coal for this increase came almost completely from other countries, with the U. S. a major supplier. Italy is not alone in needing to rely on outside sources, principally the U. S., for coking and other specialty coals, and even steam grades at times. Consequently, as outlined in the re-check in the November issue of *Coal Age*, the future for exports is still one of high and profitable volume.



**Gulf makes things run better with new lubricant for modern
NEW GULF MINING**

Now you can get more tonnage between overhauls from your continuous miners and other key equipment, with a new heavy duty lubricant—Gulf Mining Lubricant H.D.

This versatile lubricant is a semi-fluid, multi-purpose grease that meets every lubrication need at the face, and therefore simplifies application, storage and handling. You can apply it by pouring or with a grease gun.

New Gulf Mining Lubricant H.D. is fluid enough not to channel in a gear case. Yet it has

body enough to prevent excessive leakage from drive assemblies operating at high temperatures. In fact, it has "controlled leakage"—bleeds just enough to keep coal dust and other foreign matter from entering gear cases and bearings.

Gulf Mining Lubricant H.D. has high resistance to water, heat and extreme pressures. It inhibits rust and corrosion.

Proved effective in service. New Gulf Mining Lubricant H.D. has been tested for over a



mining equipment...

LUBRICANT H.D.

year at coal mines in Pennsylvania and West Virginia. It lubricates effectively under the pressures, shocks and high temperatures of modern mechanized mining.

Available now in convenient 35-lb. pails and 120-lb. drums.

Your mine can save time and reduce maintenance costs with new Gulf Mining Lubricant H.D. Try it. You'll see more proof that Gulf makes things run better! Call your nearest Gulf office, or mail coupon for booklet.

Every requirement for grease at the face can be handled quickly and effectively with new Gulf Mining Lubricant H.D. Use it to lubricate your continuous miners, automatic loaders, cutting machines—all your heavy duty equipment.

GULF OIL CORPORATION
Dept. DM, Gulf Bldg., Pittsburgh 30, Pa.

Send booklet on new Gulf Mining Lubricant H.D.

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____

CA-2368



Questions

We've been asked about the Yieldable Arch

"What kinds of mine can use the Yieldable Arch?"

The Yieldable Arch can be used in practically any type of mine where soft or heavy ground causes spalling or squeezing conditions. Yieldable Arch installations are being used in almost every type of mine you can think of—anthracite and bituminous coal, iron, copper, lead, zinc, nickel, bauxite, limestone, and asbestos.



"In our bituminous coal mine we have no problem with heavy ground or subsidence. What would we have to gain by putting in Yieldable Arches?"

It's true, of course, that roof control is the primary function of the Yieldable Arch. But it is only one of the benefits to be derived from a sound Yieldable Arch installation. We could cite a number of instances similar to yours, where Yieldable Arches have already paid for themselves through sharp reduction in maintenance expenses.

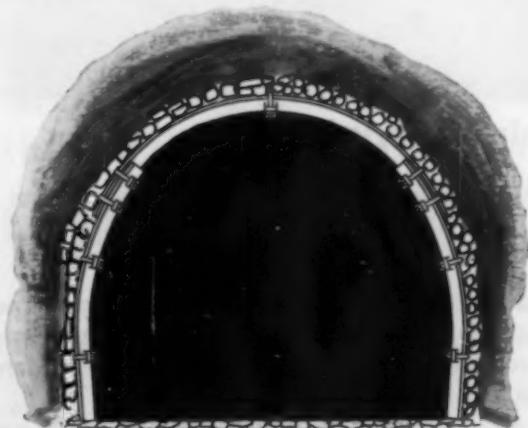
Send Us Your Questions: You probably have other questions of a specific nature concerning the application of the Yieldable Arch to your mine. If so, by all means send them in; we will study your questions and reply as promptly as possible. Write: Room 1041, Bethlehem Steel Company, Bethlehem, Pa.

For example, even though you may have no subsidence problem, it's quite likely that spalling occurs or the entry may be subject to heavy roof falls, endangering personnel and requiring substantial clean-up time. Then, too, the Yieldable Arch is a long-service mechanism which will keep haulways and drifts open and clear almost indefinitely. Thus it is ideal for coping with such conditions, eliminating the time and money ordinarily spent in support-renewals and clean-up of falls.

A good job of lagging goes hand-in-hand with a good Arch installation. Lagging and packing act as a cushion; they fill in the voids between mine roof and Arches, keep the load on the Arches relatively uniform. Lagging may be either poles, planks, or timbers, or even old steel ties (see sketch below).

If you should consider the reopening of caved areas of old workings, Yieldable Arches will prove ideal in making and keeping the entries workable.

Bethlehem's Yieldable Arch is made of U-shaped rolled steel sections. An Arch set is built up of three or more segmental lengths nested at the overlapped ends, and clamped together with U-bolt clamps to form a friction joint. This joint is designed to yield under excessive pressures, before deformation occurs in the steel, thus maintaining structural integrity in the arch while permitting the ground to relax gradually. Its success in mines all over the country can be described as little short of phenomenal.



Poles, planks, steel ties make good lagging.

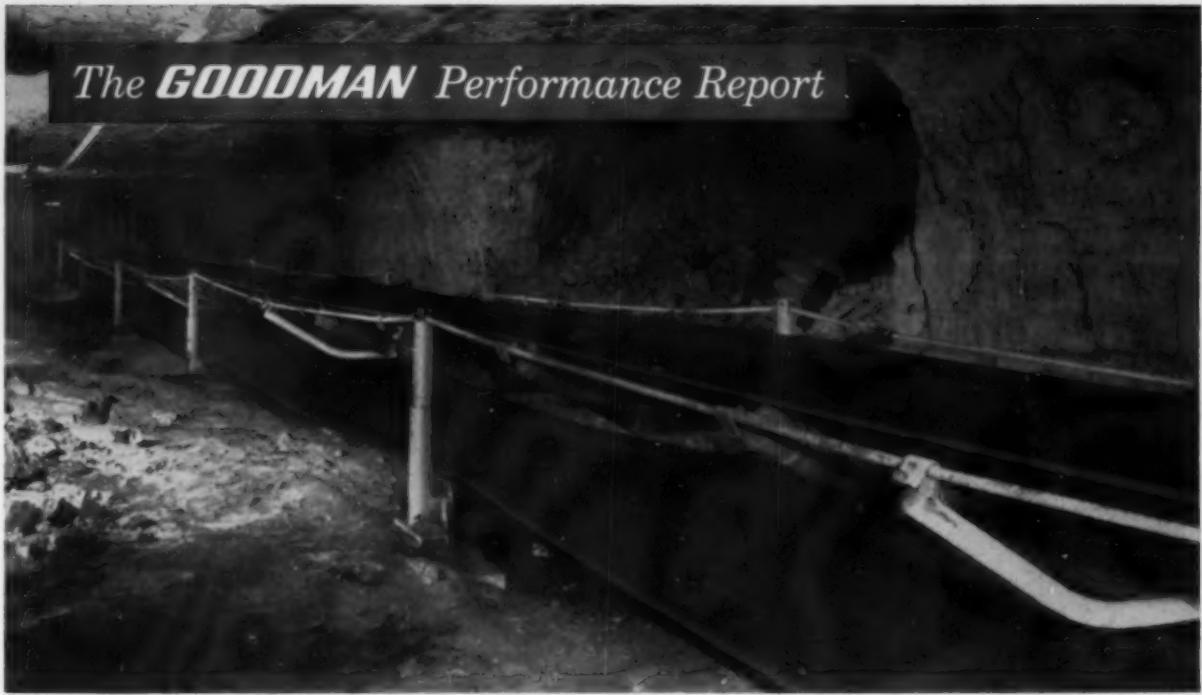
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corp. Export Distributor: Bethlehem Steel Export Corp.

BETHLEHEM STEEL



The **GOODMAN** Performance Report



How to match mine haulage to production

To make high production face equipment really pay off, operators have found it takes a completely flexible, high capacity conveying system to smooth the flow of coal out of the mine. Goodman Ropebelt conveyors are designed to meet this need by matching haulage to production . . . whether from development headings, production panels, main line or slopes. In every application . . . high or low coal . . . Ropebelt pays off in ease of installation, superior load carrying ability, and low maintenance.

Consider installation . . . Ropebelt is simplicity itself. Component parts for intermediate sections (wire ropes, hinged idlers and supporting stands) are easy to handle . . . can be set up in record time as proved in many mines. Extensions to keep pace with work advance can be made between shifts with no loss in production time. Relocation of entire Ropebelt units have been accomplished at substantial labor savings.

New for the Goodman Ropebelt

- simple, non-walking wire rope support—each side adjustable in height, cross member located between belts
- separate adjustable return roller that hangs from wire ropes
- roof suspended wire ropes — easy installation, low cost

Plus a new low Ropebelt design with a 9" rope height, 13" over-all height

Ask Your Goodman-Sales Engineer

As to load carrying ability, Goodman Ropebelt has no equal. Its full flexibility troughs the belt to whatever load is imposed and moves it without bounce or spill. And the flexibility that absorbs shock at loading points and along the line, actually increases carrying capacity at least 20% over that of other type belt conveyors. Think what this can mean for panel belts that must accept coal from shuttle cars working behind continuous miners, and for mainline belts that carry a mine's total production.

Low maintenance is a result of the same flexibility that increases capacity. Shock to idlers is minimized—their life lengthened. Belts last longer and labor cost for clean-up along the line is practically eliminated.

Add up these advantages and you'll see why Goodman Ropebelts are "key" units that let you get the most from your face equipment. Let us give you the full story.

GOODMAN
MANUFACTURING COMPANY
Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES • CONVEYORS • LOADERS
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts



TRACTION...

unequaled in any other truck

Six-wheel drive plus exclusive Balanced Bogie with Power Divider endow this Mack heavy-duty dumper with matchless traction over any surface that will support a truck.

Macks get in—and out—of spots where other trucks bog down. And especially this big, 65,000-lb. GVW Mack heavy-duty dumper—the Model B-8136SX.

Only Mack combines the six-wheel-drive feature with exclusive Balanced Bogie with Power Divider—the four-wheel, rear-axle drive that transmits the most power to the wheels having greatest traction.

Exclusive Mack front driving axle transmits power to the wheels through a single-reduction carrier and two pairs of spiral-bevel gears at the steering knuckles. Maximum ground clearance is thus attained and, being fully enclosed, the complete driving and steering mechanism is protected from dirt and water.

Exclusive Mack Thermodyne® diesel engine delivers up to 205 hp at 2100 rpm for long life and outstanding economy.

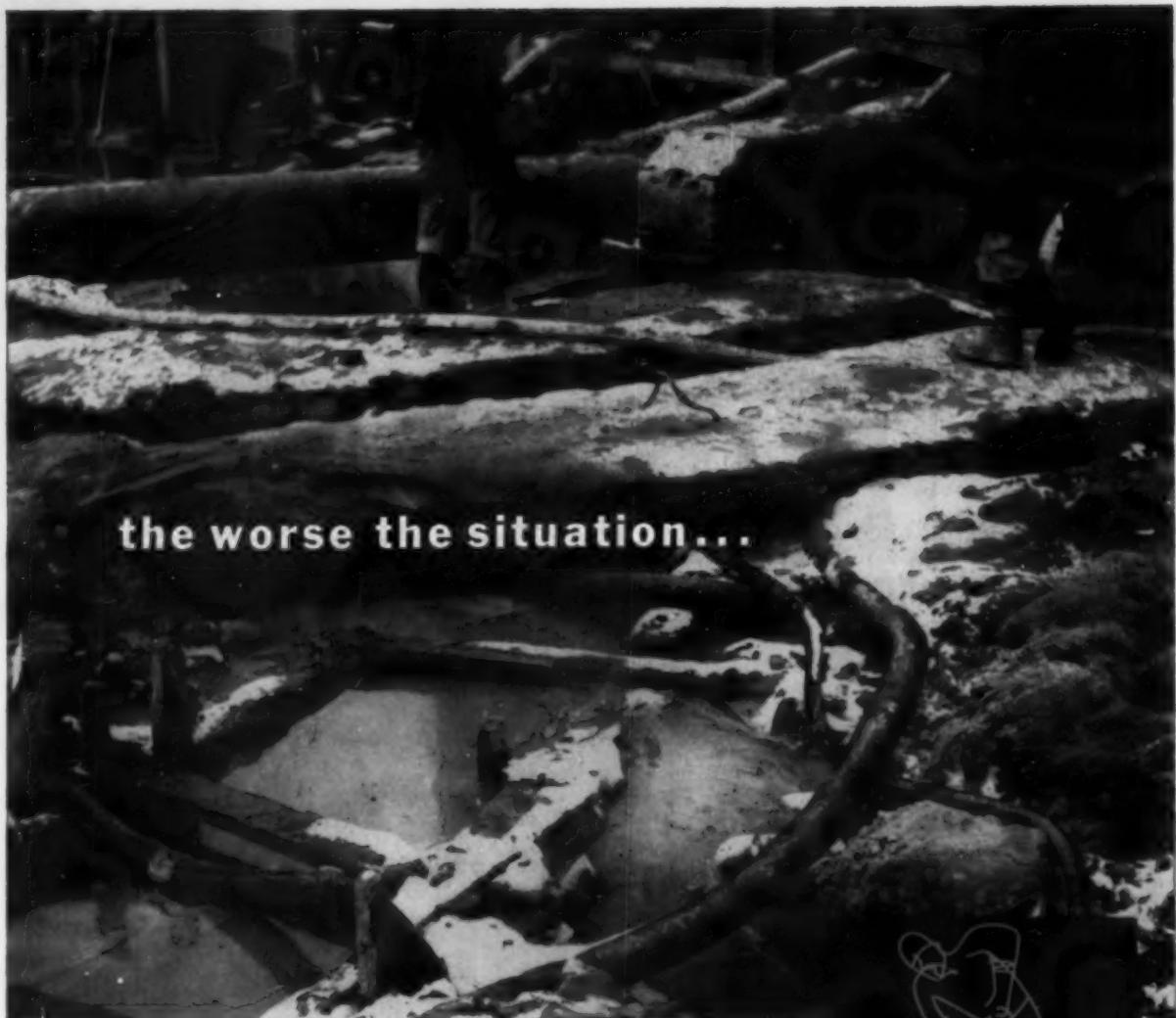
Exclusive Mack Duplex 10-speed heavy-duty transmission with in-

tegral transfer case turns engine power into steady pulling ability for year after year of dependable, repair-free life.

If next-to-impossible going is slowing down your operations, get full facts on this rugged, sure-footed Mack for arduous on-and-off highway service. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

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TRUCKS

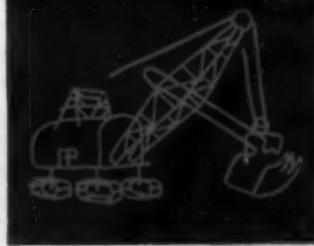


the worse the situation...

the more reason for using **TIAREX®**

TIAREX cords and cables give longest service when not subjected to severe abuse. But when required, TIAREX can take it. In snow and mud, under water and under pressure, TIAREX cords and cables remain flexible, smooth, light and easy to handle, thanks to their original cured-in-lead construction. They won't snag or tear, and their fortified and tempered neoprene armor gives balanced resistance to abrasion, water, acids, oils, sunlight and flame.

Millions of feet of TIAREX are on the job everywhere—transmitting power for mobile mining equipment, construction machinery and portable tools.



Simplex

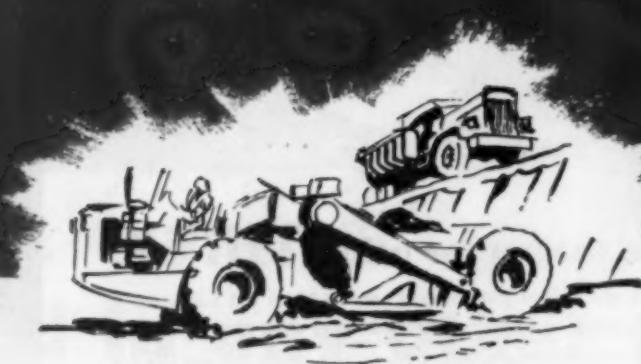
**WIRE & CABLE
COMPANY**
79 SIDNEY STREET, CAMBRIDGE 39, MASS.



"The American manufacturers of transoceanic telephone cables"

NOW the **R-1160 ROADRANGER TRANSMISSION**

**designed specifically
for earthmoving and
construction equipment**



The Fuller 9-speed semi-automatic R-1160 ROADRANGER Transmission is engineered for tractors and trucks equipped with engines of up to 1160 cubic inches piston displacement. An outgrowth of Fuller's highly-successful Model R-1150 ROADRANGER, the R-1160 is designed to handle up to 800 lbs./ft. of engine torque.

Featuring higher capacity and long wear life, the newest ROADRANGER is built to give fast work cycles, low fuel

consumption, longer engine life, less down time, reduced operator fatigue . . . and greater profits.

Standard on the R-1160 ROADRANGER is Fuller's Air Powered Countershaft Inertia Brake, which provides quick up-shifts without double-clutching simply by pressing a button. Also standard is the Fuller Pressurized Filtration System, whereby gear oil is circulated by a pump through a filter which removes me-

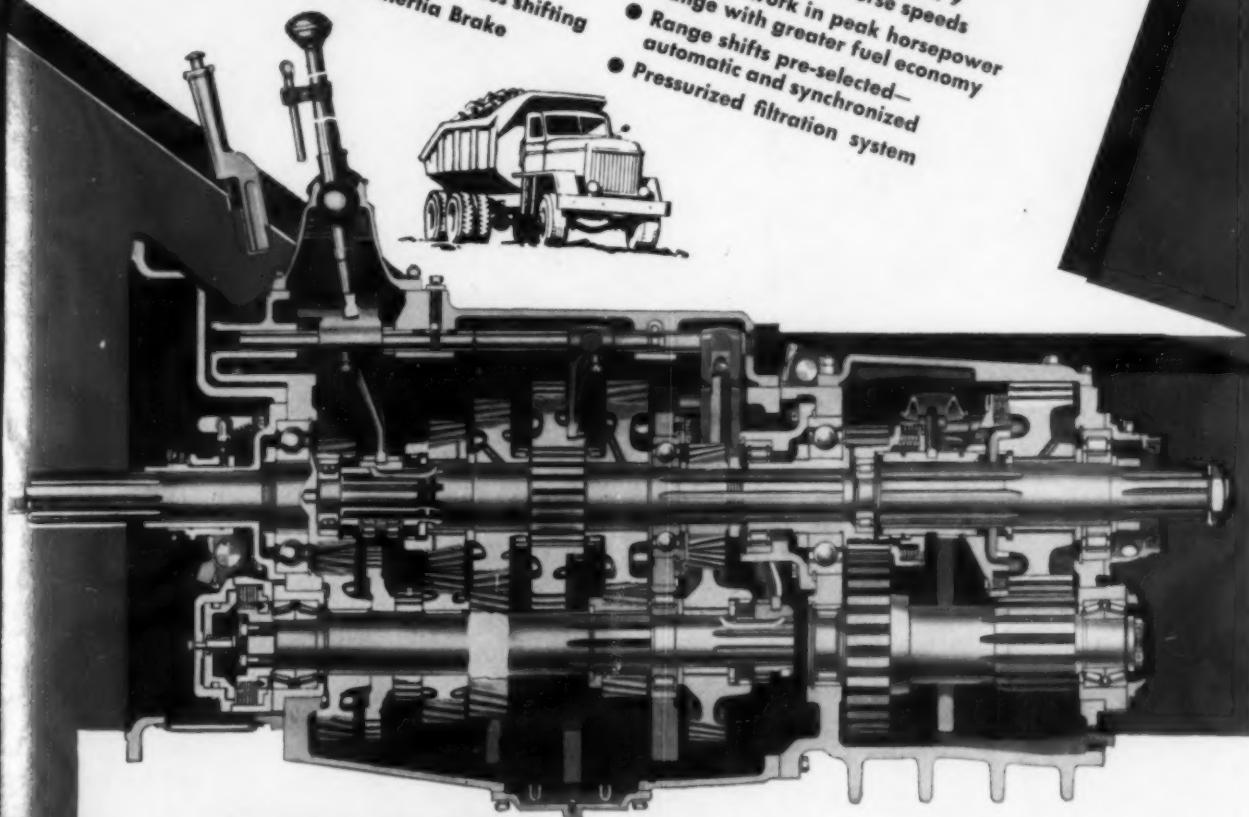
tallic particles and road grit from the lubricant.

To increase the capacity of the R-1150, Fuller widened the faces and coarsened the pitch of auxiliary drive and reduction gears. Accompanying this change is an increase in synchronizer capacity, and a new auxiliary case of greater section and length accommodates the larger gears. All front section yokes except the third and fourth are clamped to the bar.

THE R-1160

PROVIDES THESE ADVANTAGES

- No gear splitting—9 selective gear ratios are evenly and progressively spaced
- Easier, quicker shifts—38% steps between ratios
- Less driver fatigue—1/2 less shifting
- Countershaft Inertia Brake
- One shift lever controls all 9 forward and 2 reverse speeds
- Engines work in peak horsepower range with greater fuel economy
- Range shifts pre-selected—automatic and synchronized
- Pressurized filtration system



VITAL STATISTICS

GEAR	RATIOS	% STEP	
Ninth	.75	33	HIGH RANGE
Eighth	1.00	39	
Seventh	1.39	40	
Sixth	1.94	34	
Fifth	2.59		
RANGE SHIFT		34	
Fourth	3.48	39	LOW RANGE
Third	4.84	40	
Second	6.76	34	
First	9.02		
Reverse	3.31	High Range	
Reverse	11.53	Low Range	

WEIGHT: 1133 lbs. LENGTH: 44^{11/16}" OIL CAPACITY: 35-pts.; with filter, 38 pts.
CLUTCH HOUSING SIZE: SAE No. 1 APPROXIMATE ENGINE SIZE, CU. IN.: 1160



FULLER

TRANSMISSION DIVISION
MANUFACTURING COMPANY
KALAMAZOO, MICHIGAN

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Automotive Products Company, Ltd., Brock House, Langham Street, London W.1, England, European Representative



Only three moving parts in this rugged switch stand

Low and compact, this switch stand is Bethlehem's Model 1222, as sturdy and tough a performer as you'll find. It was designed for long life in heavy-duty service; here it is shown installed at a turnout built of 85-lb rail.

The Model 1222 has only three moving parts: the lever, the crank, and the sliding block. None of these parts is located beneath the base of the stand, thus the mechanism stands only $3\frac{1}{4}$ in. from top of tie to bearing flange of the lamp tip, making it ideal for use in cramped locations.

Operating on the sliding-block-and-crank principle, the 1222 develops great leverage, for easy

throwing. It is at its best when used in layouts built with 70-lb rail and heavier.

You can use this stand in connection with standard rigid rod, or with Bethlehem's No. 11 SFU spring rod as shown in the illustration. It can be furnished with special crank to carry standard target lamp or target only. If you want additional details just call our nearest office, or write to us at our general headquarters at the address below.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

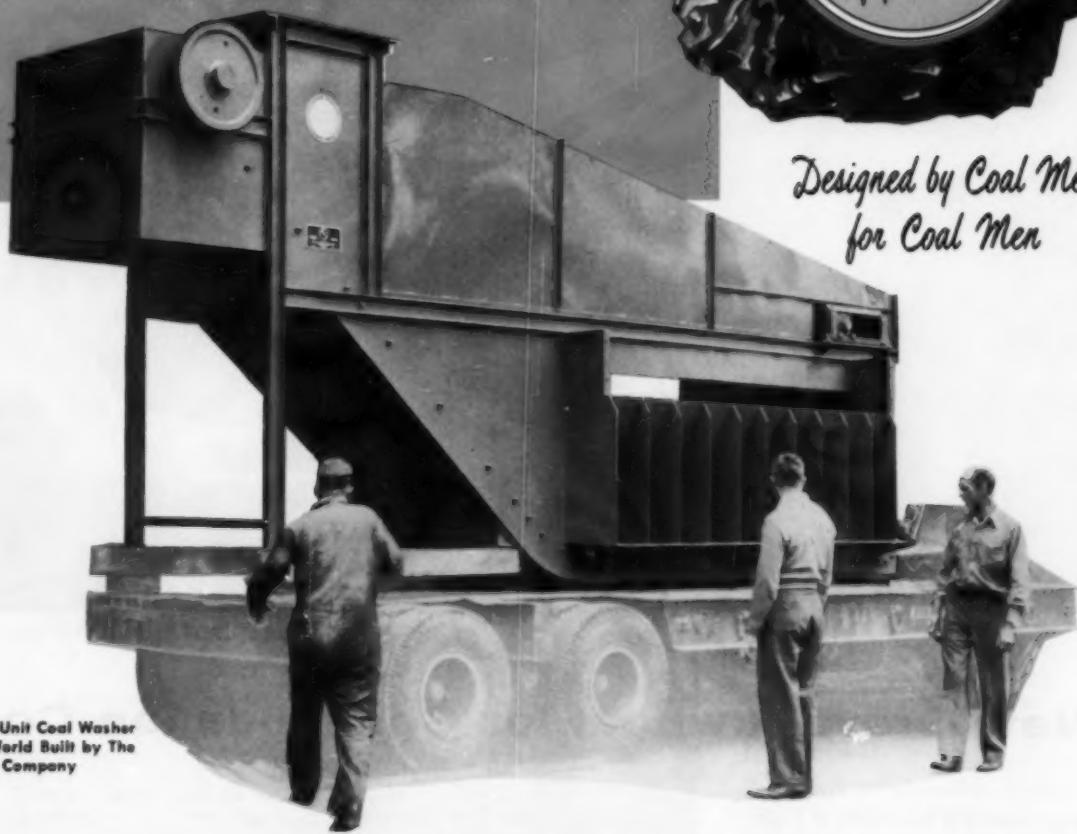
BETHLEHEM STEEL



February, 1958 • COAL AGE

HOW TO PRODUCE LOW ASH COAL DAY AFTER DAY

DMS UNIT COAL WASHER DOES THE JOB
... FITS YOUR POCKETBOOK!



Largest Unit Coal Washer
in the World Built by The
Daniels Company

DMS USERS WORKING 5 DAYS BY CUSTOMER DEMAND

You, too, can move into 5-day production because the DMS Unit Coal Washer will consistently produce the coal quality your customers want. Just one unit does it all and your preparation costs will drop 16¢ to 45¢ per ton. You can make money on the same seam

that's giving your neighbor trouble. Capacities as low as 20 TPH fit your need.

Better still! You can get delivery in 4 to 5 weeks. Join the prosperous coal men who produce *DMS-guaranteed* low ash coals. Ask us for full facts today!

DANIELS COMPANY

INDIANA, PA.

BLUEFIELD, W.VA.



Twin-screw diesel towboat *Humphrey*, 132' x 27' x 9'6".

New Dravo towboat for Consolidation Coal

Lower costs per ton mile, a major aim of Dravo's extensive marine research program, have been designed into the new 1,600-horsepower towboat *Humphrey*.

Now operating on the Monongahela, Allegheny, and upper Ohio Rivers, the *Humphrey* is the most advanced and efficient towboat of her draft on the inland waterways.

Here are some of the things that make her so:

New hull design with longer, leaner stern lines and broader stern tunnels produces more push with less power. Steering and flanking rudders have been reshaped and

relocated for better flow characteristics. Kort nozzle shape has been refined for greater thrust. Struts are located aft rather than forward of the seven-foot, stainless steel propellers which have been modified for more efficient use of engine power.

All exposed surfaces of the Kort nozzles, rudders and aft end of the hull are protected from corrosion by stainless steel.

The *Humphrey* is the fourth towboat in Consolidation Coal's fleet—all have been built by Dravo.

For more information, contact DRAVO CORPORATION, PITTSBURGH 25, PENNSYLVANIA.

DRAVO
CORPORATION



YOU CAN SEE WHAT MAKES ROEBLING MINE POWER FEEDER CABLE YOUR BEST BUY!

Tough, long-wear Roeprene® sheath wards off moisture, retards flame, resists oil, corrosion, abrasion. Meets flame-resistance requirements of Pennsylvania Dept. of Mines and carries symbol P-111.

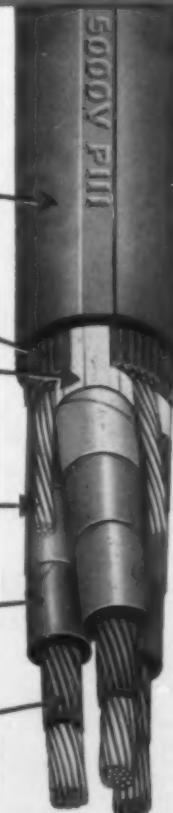
All-rubber fillers for moisture resistance, splicing ease.

Tin-copper shield tape for added safety of operation.

Adequate ground wires, in contact with conductor shielding. Grounds equal more than 90% of circular mil area of single power conductor, for complete grounding and fault return.

Butyl insulation for heat-, moisture-, ozone-resistance. Rated at 90° C copper temperature through 5000 v; 85° C through 15000 v.

Semi-conducting tape around each conductor prevents excessive voltage stress and ionization between conductor and insulation.



These are features that add up to longer, better, more economical service. Even at peak loading, rugged Roebling Mine Power Feeder Cable gives peak performance!

Pride of workmanship, special design features and finest raw materials make the difference. But don't take our word for it. See for yourself. Let us show you samples and give you recommendations and details as they apply to your application. Write to Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING 
Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

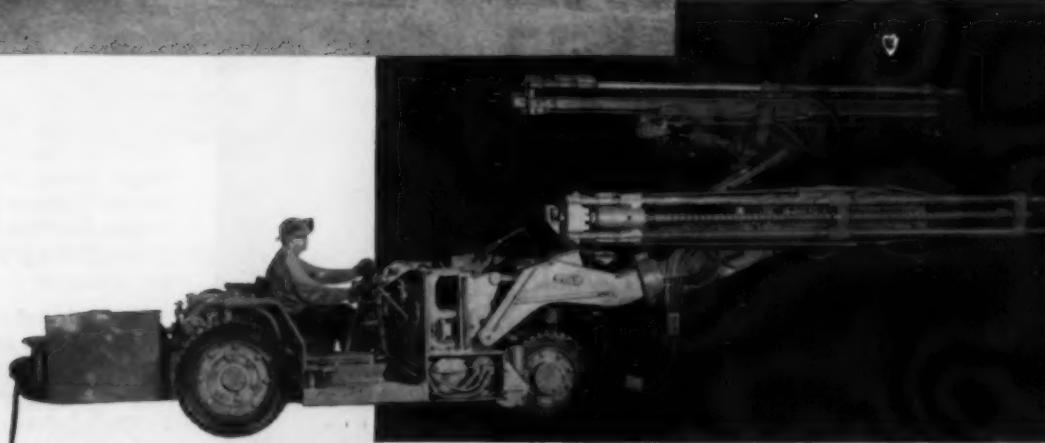
A NEW HIGH PRODUCTION TEAM FOR HIGH SEAM COAL

Maximum production from high seam mines requires machines designed especially for high seams. That's why Joy engineered the "15 Series."

These machines were designed to work as a team in coal 5½ feet and higher. The twin boom CD-43 drills 10 foot holes continuously with just one operator. The powerful 15-RU reaches up to 10 feet to top cut the highest of roofs. The 15-BU loads 15 tons per minute to keep up with the cutter and drill, and the 15-SC shuttle car hauls big loads fast enough to keep pace with the rest of the team. Each unit was designed with the others in mind as part of a team. To really lower cost per ton and move the tonnages expected of a high seam operation, check into Joy's new "15 Series."



15-RU CUTTER . . . It bottom cuts, top cuts, shear cuts or anything in between. For top cutting at 8%, 9%, or 10 ft.



CD-43 TWIN-BOOM DRILL . . . one-man version of the high-production, two-man CD-42 drill. Long steels eliminate auger changes. Capacity 9 to 12 fpm, each drill.

JOY

EQUIPMENT FOR MINING



All Joy coal mining equipment, including the "15 Series," is available with AC or DC.

JOY MANUFACTURING COMPANY, Oliver Building, Pittsburgh 22, Pa.
In Canada: JOY MANUFACTURING CO. (Canada) Limited, Galt, Ontario

CL7552-247

JOY

"15 SERIES"

CUT 15-RU

DRILL CD-43

LOAD 15-BU

HAUL 15-SC



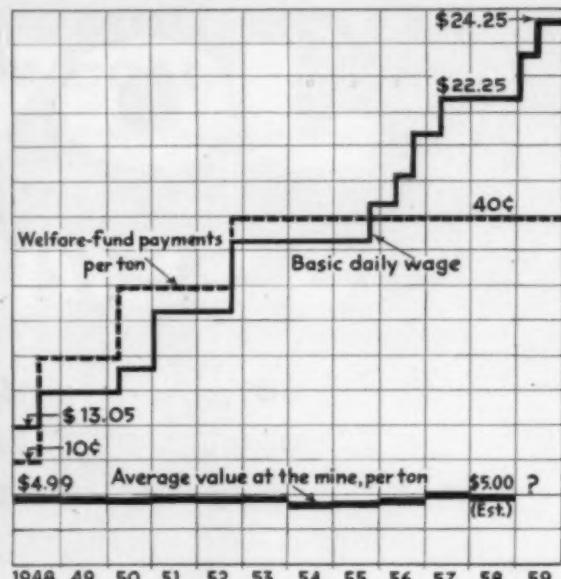
15-SC SHUTTLE CAR . . . 87" high . . . hauls 15 tons in one load for easier, faster loading; fewer trips; cheaper haulage.

15-BU LOADER . . . loads 15 tons per minute. Model shown is 80" high . . . lower model, 48" high, works 84" coal.

News Roundup



NEW ANTHRACITE CONTRACT is signed by John L. Lewis, president, United Mine Workers, while G. B. Fillmore, president, Hudson Coal Co., representing operators, looks on.



TEN YEARS in bituminous wages, welfare-fund payments and average mine value. Heavy investments to nearly double tons per man have made it possible to keep prices stable.

Coal Prices -- Fluid After New Contracts

Increased miners' wages necessitate bituminous rise. Anthracite pact signed . . . prices also up.

PRICE INCREASES, reflecting recent wage hikes granted the United Mine Workers, were announced by some coal producers to be effective Jan. 1, 1959.

Among others, Appalachian Coals, Inc., marketing agency for many high-volatile bituminous coal mines in southern West Virginia, eastern Kentucky and Tennessee, established price rises varying from a minimum of 15c on industrial steam sizes to a minimum of 25c per ton on all specially prepared coals.

ACI said that "further consideration will be given to additional changes in price on April 1." This evolves out of the fact that another 80c pay rise is due at that time for UMW workers, who were boosted \$1.20 on Jan. 1, part of a \$2 raise agreement. When the total increase is effective the rise in mining costs could aggregate as much as \$1 per ton with many concerns experiencing rises of 20 to 50c. In Districts 7 and 8, according to calculations by the Southern Coal Producers' Association, the increases after April 1 would be as follows: District 7, 35 to 47c; District 8, 32 to 41c. Overall, the pressure will be to push up the average mine value of bituminous, which is estimated at \$5 a ton in 1958, down from \$5.08 in

1957, especially since many operators see the coal industry as being unable to absorb the wage increases due to the already low profit margins.

Termination Notice—The UMW Jan. 5 served notice that the present wage agreement will terminate March 8 on the Harlan County coal operators' Association in southeastern Kentucky, members of which regarded their cost problem as so great that they refused to sign the new wage agreement.

Others Object—Bruce Gabbert, president, Monongahela Valley Independent Coal Operators' Association, W. Va., asked John L. Lewis for relief, maintaining that many small operators would not be able to operate their mines chiefly because of the 40c a ton

miners' royalty fund required under the new contract. It was explained that the operators do not produce enough to compensate for such an obligation.

Small operators in the Monongahela area said that the problem may affect other independent operators in Marion, Taylor and Barbour counties, included within District 31 of the UMW. A veteran operator in that area stated that a combination of items in the new contract produced the financial squeeze.

Side Note—Under the terms of the new agreement representatives of the union and the producers will be part of a committee to handle any problems arising under the contract. It has been anticipated that the committee makeup will be: Edward Fox, president, Bituminous Coal Operators Association, representing northern and eastern commercial operators; Joseph E. Moody, president, Southern Coal Producers Association, representing southern producers and Hamilton Beebe, Chicago, for the midwest, including Illinois, Indiana and West Kentucky operators. For the UMW: John L. Lewis, president; Thomas Kennedy, vice president; and John Owens,

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secretary-treasurer.

(Continued)

**The simple, low cost answer
to these coal preparation
plant problems...**

- 1 Recovery of marketable coal fines
from washing plant waste**
- 2 Removal of solids from washery
plant effluent**
- 3 Reclamation of water in closed
water systems**

SIMPLE • EFFICIENT • PROFITABLE

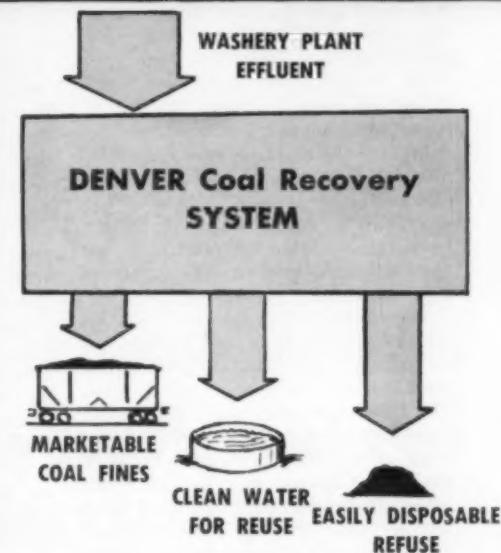
Since more fines are produced in mechanized mining, it is not economical to discard coal fines to waste even though ash contaminants may render these fines unmarketable without additional cleaning. Washeries faced with recovery of clean coal fines, removal of solids from plant water and providing a closed plant water system, now have a simple, low cost answer.

Whether you are confronted with any or all of these problems, DENVER can provide the answer with a simple, low cost system that will recover both coarse and fine, marketable, low ash coal from minus $\frac{1}{8}$ " down to 200 mesh and finer. A compact system that will reclaim water for reuse in a closed system—one that permits disposal of high ash washery waste without stream contamination—efficiently and profitably.

DENVER offers over 30 years of experience in designing and supplying coal washery plant systems. A complete service from testing to flow-sheet to equipment, installation and to profits. One source—one responsibility.

DENVER

Coal Recovery SYSTEMS



**DENVER offers one source
for COMPLETE SYSTEMS,
INDIVIDUAL COMPONENTS**



"The firm that makes its friends happier, healthier and wealthier"



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EQUIPMENT
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Please send details of your complete
system and service for handling coal
washery effluent.

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Title _____

Company _____

Address _____

City _____ State _____

News Roundup (Continued)

Customer Reaction—Some big eastern utilities were not as cheerful as ACI when faced with the price boost, and indicated they would put up stiff resistance. A few of these major power producers on the Atlantic seaboard reportedly warded off the Jan. 1 increases. Public Service Co. of New Jersey, for one, says it is not paying any more for coal and doesn't expect to in the near future. Other big users have threatened to switch to oil if coal goes up.

May Delay—Experts' reaction are that the resistant companies are not likely to consider a switch from coal as long as that reliable fuel remains at a competitive price. However, general opinion is that northern West Virginia mines supplying New York area utilities won't try to put through higher prices until April.

Steel On Spot—The result, higher coal prices, seems not to worry steel producers as much as the cause, the coal wage hike. Although the companies could absorb the increased prices without much difficulty, according to reports, they will have a harder time warding off other wage increases because steel workers are raising their wage sights.

Key reason is that the coal wage increase has widened the gap between the United Mine Workers' and the United Steel Workers' pay to about 30c an hour. The USW deals with many of the same employers as the Lewis union and because of this close relationship between the two industries that has often influenced demands of steel and coal workers, there is a fair amount of certainty that the USW will ask for "equalizing" rates. If haggling touches off a summer strike, it could hurt coal in what is expected to be a recovery year.

Anthracite Pact

A new anthracite contract effective from Feb. 1 and to run for one year, at which time it can be terminated by either side on 60-day notice, was signed by anthracite operators' representatives and negotiators for the United Mine Workers.

The agreement contains three major clauses providing for:

1. A \$1 per day wage increase to affect some 22,000 hard coal miners in the eastern Pennsylvania anthracite fields.

2. An increase of 20c in the tonnage royalty paid toward the industry's welfare fund, raising the amount per ton from 50 to 70c.

3. A boost in annual vacation pay from \$140 to \$160.

Thomas Kennedy, UMW vice president, said the increase in the welfare

royalty will permit the fund to operate "in the black" on its present basis of benefits. Lagging anthracite production had reduced the royalty yield so that the regular \$100 monthly pension payments to about 15,000 retired miners were cut some months to as little as \$30, although more recently they have been up to \$50 a month. In general, Mr. Kennedy and John L. Lewis, UMW president, expressed satisfaction with the contract.

Harry Bradbury, president of Glen Alden Corp., Pa., stated that the operators were pleased with the agreement and consider it "A good deal" for both the industry and the union. "I hope the industry will continue and will prosper as a result," he added.

Key Role—The Anthracite Board of Conciliation is greatly responsible, according to the Anthracite Information Bureau, for the fine mutual spirit of union leaders and operators, which has facilitated continuous renegotiation of the contract without work stoppage since 1926. The Board, which handles questions arising during the life of the contract, was formed in 1902.

Prices Up—Shortly after the new contract was signed it was announced that hard coal prices would go up anywhere from 60c to \$1 a ton on Feb. 1 when the agreement goes into effect. During 1958, Mr. Bradbury said, prices of coal at the mine averaged from 60c to \$1 a ton below the 1957 level because of the weakness of the market. Consequently, he added, the price adjustment would be merely a matter of bringing hard coal prices back in line with list prices rather than an increase in the list price.

Another leading producer in northeastern Pennsylvania's anthracite belt said that though his company had no program planned at the moment, they would have to recover the cost of the wage increase and would be sending out new price circulars very shortly.

Coal Firms Merge

Princess Elkhorn Coal Co. and the Powellton Coal Co. of Huntington, W. Va., have officially merged to form Princess Coals, Inc., under the guidance of David L. Francis, president.

The new organization has announced the purchase of Sycamore Coal Co. and Cinderella Coal Corp., which will be operated as wholly owned subsidiaries. Combined employment of all the firms will total about 1,500 men.

Mr. Francis stated, "This consolidation fits us like a glove. It puts together the

2,500,000 ton production of Powellton and Princess with the 1,000,000 ton production of Sycamore and Cinderella so that we will have a production capacity in excess of 3,500,000 tons per year. It gives our combined organizations production on three railroads and a wide variety of high-quality coals that are in demand in all types of coal markets, including by-product, domestic, utility and export. We anticipate many resulting efficiencies and savings by the combination of staff and management functions so that all our organizations will benefit thereby."

Charles A. Hamill, president of Sycamore Coal Co. and the Cinderella Corp. said, "It is recognized that in order for the medium size companies such as ours to keep abreast of the competition with larger coal companies, as well as oil and gas, mergers of this type are most healthy and strengthening to all concerned."

Sycamore Coal Co., Huntington, W. Va., was founded 48 yr ago where it began mining in the Winifred seam outside Williamson, W. Va. Just before the second World War the Cinderella Coal Corp. was formed to develop a virgin territory of high grade domestic coal in the eastern section of Pike County, Ky. The coal produced by these firms has been sold exclusively by the Old Ben Coal Corp. of Chicago for the past 32 yr and Mr. Francis indicated this relationship would continue with Old Ben coordinating with the Princess Coal Sales Co., marketing organization for Princess Coals, Inc.

Agree on Research

An agreement between the Consolidation Coal Co. and The Standard Oil Co. of Ohio to begin joint research on methods of making hydrocarbon liquid fuels from coal has brought the possibilities of this field into sharp focus.

This handshake on research evolves out of the experience of the two firms working together in a jointly owned affiliate, The Mountaineer Carbon Co., Cresap, W. Va., which is engaged in the calcinating of coke for the aluminum industry.

Consol Coal has been at work in the hydrocarbon field for some time at its Library, Pa., laboratories. Standard Oil of Ohio plans to begin participation at its Research Center and Process and Product Development Div. laboratories in Cleveland during 1959.

Research officials indicate that it may take 5 to 10 yr of development work in order to reach the point where commercial applications may be considered.

(Continued on p 58)

BUCYRUS-ERIE COMPANY uses 14 Timken bearings at critical points in the crowd, main and swing machinery of the "River Queen" to take radial, thrust loads in all combinations.



Giant shovel swings 80-ton bites 300 ft., stacks 'em 100 ft. high, 14 **TIMKEN®** bearings take the loads

IT'S a whopper!—this Bucyrus-Erie 1650-B stripping shovel. It weighs in at over 2,400 tons, rises 140 ft. high. Taking 80-ton bites of overburden, it can pile up a "mountain" of 100,000 tons in a 24-hr. period. 15 electric motors power the giant, one of the largest mobile land machines ever built in the U. S. Yet one man in an air-conditioned cab controls the entire digging operation.

To take terrific radial and thrust loads 14 Timken® tapered roller bearings are used at critical points in the crowd, main and swing machinery. Their tapered design enables them to take any combination of radial and thrust loads. The

full-line contact between rollers and races gives Timken bearings extra load-carrying capacity, too. And they shrug off shock loads; they're case-carburized to have hard, wear-resistant surfaces and tough, shock-resistant cores.

Timken bearings are geometrically designed to roll true. And they're precision-made to live up to their design. They virtually eliminate friction. And by keeping housings and shafts concentric they make closures more effective. Dirt stays out; lubricant in.

We even make our own electric furnace fine alloy steel, for extra quality control. No other American bearing maker does. For your No. 1

bearing value, specify bearings trade-marked "TIMKEN". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



This symbol on a product means its bearings are the best.



TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD

~~\$175?~~
~~\$220?~~
~~\$270?~~
~~\$310?~~
~~\$340?~~

HOW TO SAVE PER DAY...



*For packing industrial explosives

One of these figures probably comes close to the potential savings in YOUR operation when you switch from your present method to the new and improved Bemis Explosives Bags. It depends, of course, on how many holes you shoot per day, and how heavily you load the holes.

Take, for example, the figure of \$270 per day savings. It works out this way: Cans cost approximately 70 cents each. Assuming you load 10 cans per hole and shoot 60 holes per day, your container cost is \$420 per day.

But Bemis Explosives Bags cost only 20 to 25 cents each. At 10 bags per hole and 60 holes per day, that is \$150—a saving of \$270 per day.

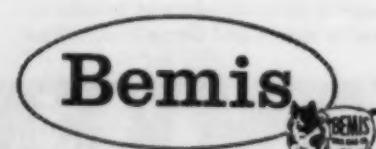
Furthermore, Bemis Explosives Bags are the toughest *really waterproof* explosives bags you can find. Leave them in wet holes three days or more . . . and they still shoot perfectly. The Bemis extruded seamless poly liner provides the waterproofness; the tough burlap or Bemis Flexiply® (multi-ply creped kraft) outer tube supplies the strength.

Look for the red stripe which identifies Bemis-extruded *pinhole-free* poly. Write or phone us . . . and a Bemis specialist will see you promptly.

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EXPLOSIVES
BAGS*

YOU DON'T HAVE A
BAG-PACKER?

There's a simple solution to that problem . . . a Bemis Packer-Ette. The capital investment is surprisingly small. It maintains a steady production of six bags per minute. Two-man operation . . . substantial labor saving. Accuracy to 3 ounces on a 33-lb. bag. Complete cleanliness.



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ENEMY OF WEAR,
DOWN TIME AND WASTE
AT BUCKHORN MINE



Processing plant of Bell & Zoller's Buckhorn Mine, Johnston City, Illinois uses STANOLITH Grease MP.

STANOLITH GREASE MP



Situation: As with every underground mine, equipment at Buckhorn Mine is susceptible to wear unless moving parts are protected with a grease film that stays in place regardless of heat, water or dirt.

What was done: Buckhorn Mine management knew where to turn for assistance on lubrication and experienced advice on how to protect equipment from wear. They called on Standard Oil mine lubrication specialist Hervie Dillingham. Hervie recommended STANOLITH Grease MP. This lithium grease is particularly suited to mine lubrication jobs because of its (1) ability to shield parts from grit and dirt, (2) resistance to both high and low temperatures and (3) resistance to water wash out. STANOLITH Grease MP holds its consistency even under the severe working conditions encountered in the lubrication of mine equipment. With its ability to provide lubrication over a wide range of applications, fewer greases need to be inventoried. One drum of grease instead of many different ones reduces costs, saves handling on the job, eliminates application mistakes.



You've got to get down there to see the problem. Standard's Hervie Dillingham does just that. Hervie has experience and training to know what's needed. He has been providing technical service to mines for more than 20 years.

**Quick facts about
STANOLITH Grease MP**

- Capable of providing superior lubrication over a wide range of applications
- Water resistant
- High temperature resistant
- Pumpable in grease gun or pressure system
- Mechanically stable

What you can do: Let a Standard Oil lubrication specialist help you find ways to eliminate your lubrication problems. One of these men is on the staff of each of the 48 district offices in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

YOU EXPECT MORE FROM  AND YOU GET IT!

People in Coal



His Job Grows Larger

DAVID L. FRANCIS, who will head the newly formed Princess Coals, Inc., faces the tasks ahead of him fortified with a wealth of experience in the coal industry. As the president

of Princess Elkhorn Coal Co. and Powellton Coal Co., he spearheaded the merger of the two firms as well as the purchase of the Sycamore Coal Co. and the Cinderella Coal Corp.

This concise summation of his reasons serves to illustrate his approach to policy and operating questions: "This consolidation fits us like a glove . . . we anticipate many resulting efficiencies and savings by the combination of staff and management functions so that all our organizations will benefit thereby."

Mr. Francis represents a name known and respected in the coal industry. His father, James D. Francis, who died in January of 1958, formed the Mallory Coal Co. near Man, W. Va., in 1918, and was prominent for over 40 years in coal, holding at his death the position of chairman of the board at Island Creek Coal Co. Mallory ceased operations in the early 1940's but became the Powellton Coal Co. in 1943, which soon became associated with the Princess Elkhorn Co., established in 1939 near Prestonsburg, Ky.

David Francis was responsible for development and installation of the Princess Elkhorn mines and was vice president and general manager of the company until World War II. After serving in the Navy, he returned to become president of Princess Elkhorn and subsequently The Powellton Company and Princess Coal Sales Co.

He has been a member of the City Council of Huntington for the past 3 yr and also president of the Tri-State area Boy Scout Council. This fall he was awarded the Silver Antelope, the highest scouting award on the regional level presented to adult scouts. In 1955 and 1956 he headed the Cabell County Cancer drive and the United Fund-Red Cross drive.

Nationally, Mr. Francis is a director of the United States Chamber of Commerce; Southern States Industrial Council; Southern Coal Producers' Association; Appalachian Coals, Inc.; and American Coal Shipping, Inc.

series of promotions preceding his election to president, he became safety director, assistant general superintendent, and later general superintendent. In 1953 he was elected vice president in charge of operations.



A. Vernon Sproles retired from the presidency of Consolidation Coal Co's Pocahontas Fuel Co. Div. on Jan. 1. A graduate of Bluefield Normal and Business College, Mr. Sproles has been with Pocahontas and its predecessor companies for 50 yr, having started in 1909 as a member of the engineering corps in one of the firm's mines. In a



Peter P. Ferretti is the new president of Pocahontas Fuel Co. Div. of Consol-

idation Coal Co., replacing the retiring Vernon Sproles. Mr. Ferretti is a native of Crucible, Pa., studied at the Indiana Technical College and the University of Alabama, and has a mechanical engineering degree. From 1946 to 1948 he represented the Goodman Mfg. Co. in the Huntington, W. Va. territory, after which he joined the staff of the Clinchfield Coal Corp. as a production engineer. In 1952 he began at Pocahontas Fuel Co. as assistant superintendent of its Itmann mine, became assistant general superintendent of mines in May, 1953, general superintendent in April, 1954 and vice president in December, 1957.

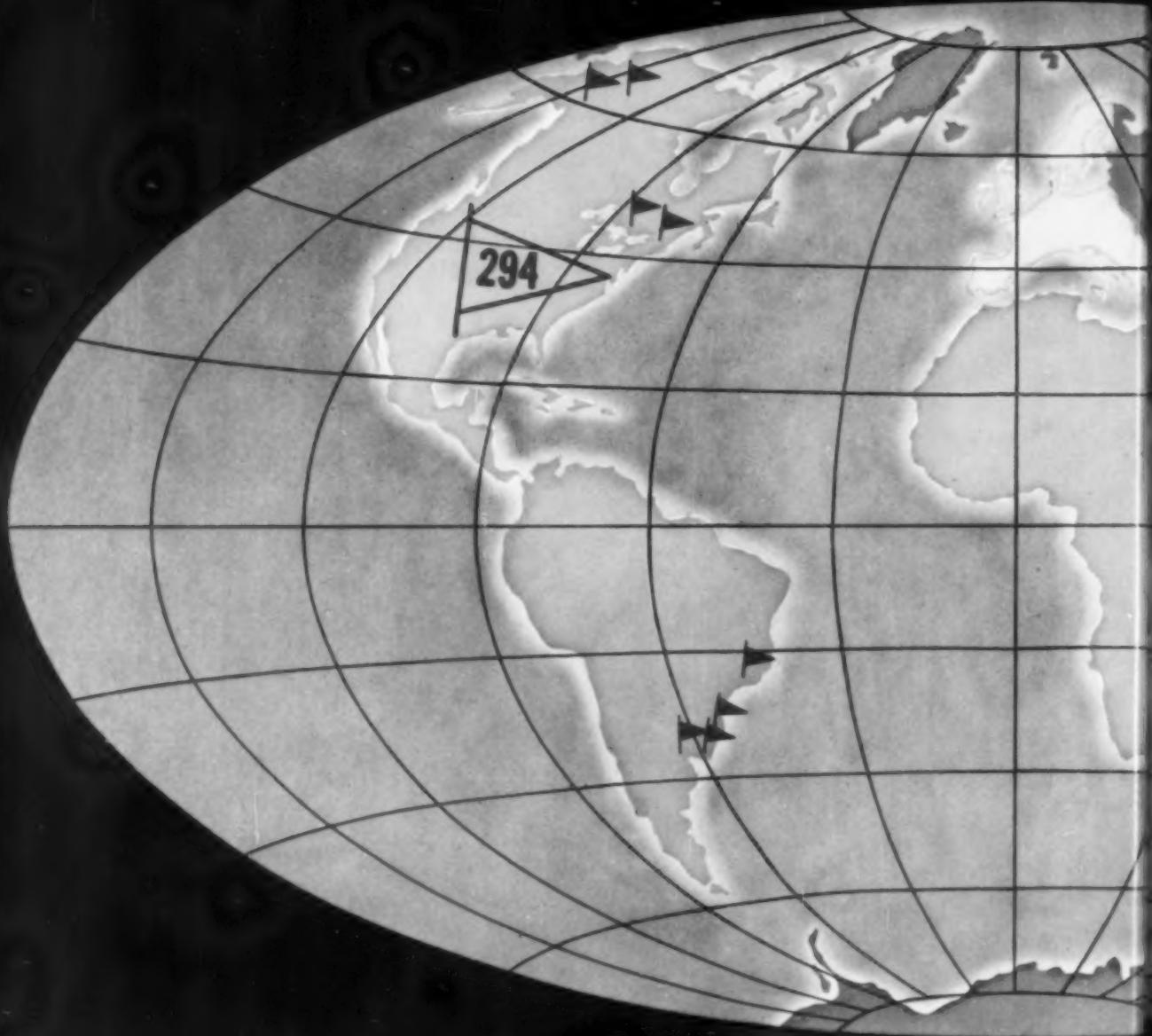
Joseph T. Kennedy has been reappointed secretary of mines and mineral industries of the Commonwealth of Pennsylvania, an office he has held for the past four years. Mr. Kennedy, a graduate of Scranton University, started work in the mines in 1916 and 13 yr later became secretary to the president of District 1, United Mine Workers of America. He has directed the State-

(continued on p 38)

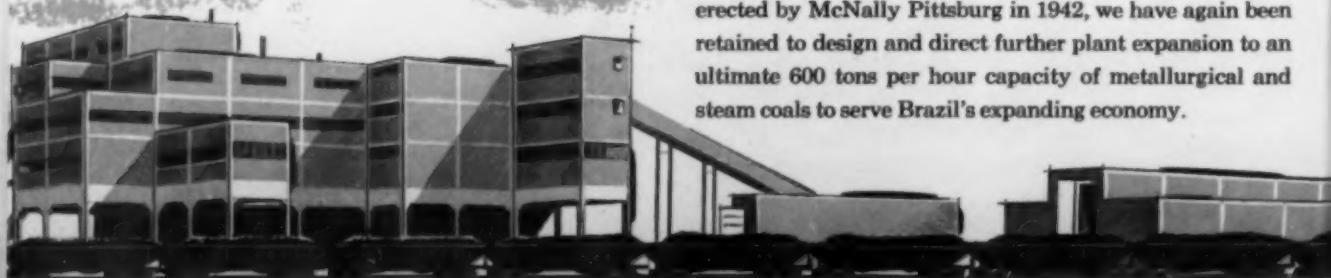
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has built more complete
coal preparation plants
than anyone else
in the world**



McNally High Efficiency Coal Preparation



**This Modern High Production Plant in Brazil is Typical of the
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For many years the Companhia Siderurgica Nacional plant in Brazil has been outstanding for high efficiency, low cost fuel production. Originally conceived, fabricated and erected by McNally Pittsburg in 1942, we have again been retained to design and direct further plant expansion to an ultimate 600 tons per hour capacity of metallurgical and steam coals to serve Brazil's expanding economy.

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COAL IS PRODUCED
AT A PROFIT...
THERE YOU'LL FIND
A McNALLY PITTSBURG
AUTOMATIC
PREPARATION PLANT

Since introducing a perfected process in 1930 for automatically cleaning coal, McNally Pittsburg has built 322 plants in every part of the civilized world. From the smallest 25 tph plant up to the 2000 tph giants—McNally Pittsburg's vast experience with every type of coal cleaning, drying, and loading equipment is your assurance of the "right" plant for your particular needs.

Find out for yourself why McNally Pittsburg is preferred all over the world! Write today.

Ask the men who know coal from the ground up

... Find out just how much extra capacity and extra efficiency you, too, can realize from the experience the McNally Pittsburg engineers have gained in the designing and building of more complete coal preparation plants than any other company. Fill in and mail the post card now!

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McNally Pittsburg Manufacturing Corporation—Manufacturing Plants: Pittsburgh, Kansas • Wellston, Ohio—Engineering and Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburgh, Kan. • Wellston, Ohio

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Please send me information about the following equipment:

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 Heavy-duty Equipment Coal Cleaning Thermal Dryers
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Company _____

City _____ State _____

Ask the man from

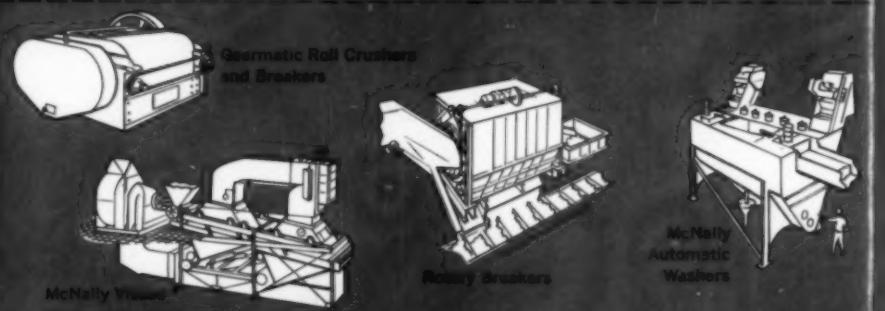
M'C NALLY PITTSBURG . . .



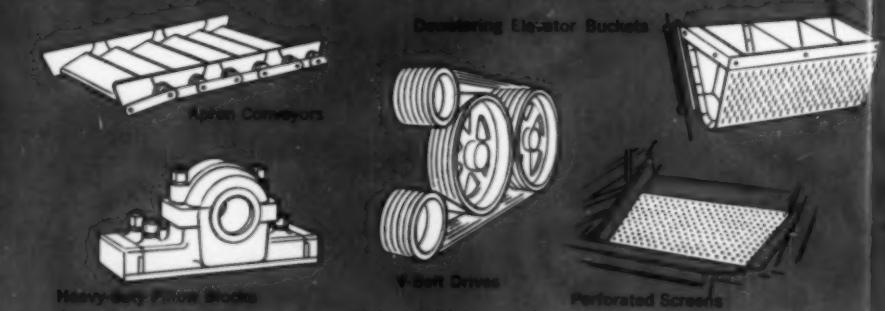
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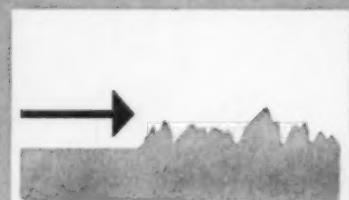
M'C NALLY & PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

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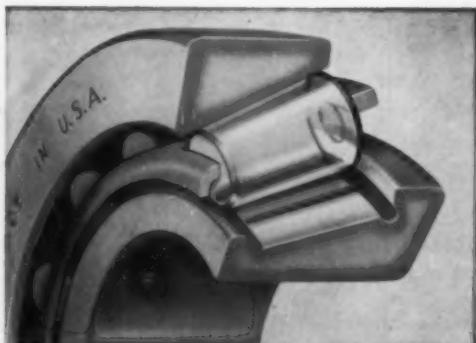
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Better products, faster, from your Bower bearing specialist:



HONING PROCESS mows down microscopic imperfections still left on bearing raceways after final grinding.

Bower mows down sub-miniature "mountains" so bearings roll longer down in the mine



Bower Tapered Roller Bearings are *Spher-O-Honed*:
1. Roller heads are spherically contour-ground, need no "run-in;" 2. Oil groove is bigger for positive roller-head lubrication; 3. Honing superfinishes inner and outer races for longer life.

Bower hones bearings to reduce friction; save you money on equipment downtime and maintenance costs

Finish grinding of bearing raceways still leaves minute surface blemishes—"mountains" under magnification. So Bower takes a costly extra step . . . uses a honing process to smooth off these microscopic mountains.

Super-finished raceways offer less resistance to rollers. This reduced friction naturally results in less wear and longer life. Bower tapered roller bearings need no initial "run-in." You get higher tonnages from machines, more efficient materials handling; save on bearings and high-cost maintenance labor.

Your Bower bearing specialist can give you fast delivery on his complete line of tapered and straight roller bearings. Call him when you need replacements!

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COAL AGE • February, 1959



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the plate
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**Hendrick H Quality Steel Plate
Screens Coal Easier, Faster,
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Hendrick H Quality Steel Perforated Plate, made from heat-treated high carbon or stainless steel, are your best replacements. This carefully-developed metal is tough and rugged under continuous and heavy use. It screens coal easier and faster, while full clearance

reduces downtime due to blinding. Product uniformity is assured throughout the life of the screen.

Order Hendrick H Quality Steel with either flat, corrugated, or stepped surfaces, in any desired shape and with any size of perforation. Whatever you order, you get Perforated Plate which reflects Hendrick's 82 years of experience in selecting the kind of steel the mining industry needs.

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NOW IN AEROSOL SPRAY-ON CANS!



HANDI-LUBE LIQUID GEAR COMPOSITION

For open gears, sliding surfaces—exclusive formulas eliminate metal to metal contact, keep wear on the lubricant not the metal—no breakdown even after prolonged use under water—available for every climatic condition—packaged in handy 16-oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.



WIRE ROPE SPRAY LUBRICANT

Exclusive formulas for lubricating and protecting wire rope, chain, springs. Penetrates to the core of wire rope minimizing internal friction and increasing usable life up to 300%—special protective qualities absolutely eliminate corrosion—non-gumming qualities reduce "carry-back"—packaged in handy 16 oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.

65 YEARS OF LEADERSHIP LUBRICATING THE FOLLOWING:

- Open Gears, Dripper Sticks, Coms
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LUBRICATING ENGINEERS
CLEVELAND 4, OHIO, U.S.A. PHONE: VULCAN 3-7272

People in Coal (Continued)

Federal Joint Mine Drainage Program and serves as chairman of the Coal Research Board as well as chairman of the anthracite committee of the Production Control Plan.

E. P. Humphrey retired as president of Stonega Coke & Coal Co. He was associated with Stonega for 23 yr, as well as the Westmoreland Coal Co. and other allied interests. He will continue as a member of the board of directors of several companies of the Stonega group.



E. B. Leisenring Jr., has been elected president of the Stonega Coke & Coal Co. He succeeds E. P. Humphrey who has retired. Mr. Leisenring was also elected vice president of the Westmoreland Coal Co., Westmoreland, Inc., and the Virginia Iron Coal & Coke Co., and vice president of General Coal Co.



John A. Stachura has been appointed vice president in charge of operations for Enoco Collieries, Inc., a subsidiary



NEW ACME HI-LIFT

MODEL
HSHL-4B

For Best Results in High-Vein Roof Bolting

The ACME (Model HSHL-4B) HI-LIFT is an innovation in modern mining technique designed to facilitate roof control in high-vein mining operations. The ACME HI-LIFT is a four-wheel drive, tractor type steering, unit with an elevating drilling deck on which are mounted two traveling and traversing Le Roi S12VT Nu-Matic stopers. The elevating platform enables the operator to work at the most convenient height for greatest efficiency. The stopers move on a traveling rail thereby permitting drilling at virtually any spot on the platform. The drills are of the integral dust collecting type and the dust collectors are mounted beneath, and on the sides of, the platform. Safety timbers can be placed between the platform and the roof to afford protection to the operator from roof slabbing and falls. The platform will support a 30,000 pound weight and can be tilted 15 degrees front to back. In addition the ACME HI-LIFT has four leveling jacks with an effective stroke of 10" for leveling in bad bottom or on high grades. Two complete sets of controls are furnished as standard equipment, one being on the platform and one on the tramping deck. A powerful 40 HP motor drives the complete hydraulic system for the unit.

COMPLETE SPECIFICATIONS WILL BE
GLADLY FURNISHED UPON REQUEST



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WILLIAMSON, WEST VIRGINIA

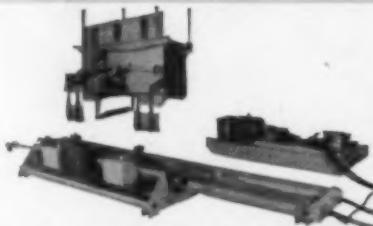
WAREHOUSE AND SALES OFFICE • REPRESENTATIVES IN PRINCIPAL
MORGANTOWN, W. VA. MINING AREAS

NEW!

Revolutionary

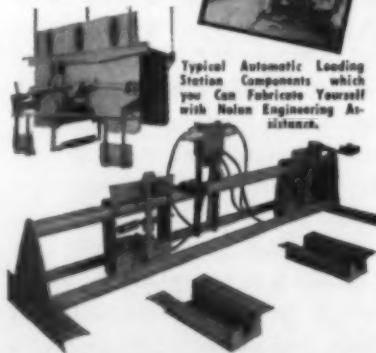
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Plan for Automatic
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Components either for Com-
plete Automatic Loading
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to Fabricate Yourself



YOUR CHOICE OF SERVICES

1. Safety engineered Nolan drawings of certain components for your own fabrication, plus other essential units supplied by Nolan, for your finished assembly.
2. All components furnished by Nolan for your finished assembly.
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Lentz Safety Limited, Toronto 18, Canada.

People in Coal (Continued)

of the Enos Coal Mining Company. Mr. Stachura received his college training from Carnegie Institute of Technology and later was an instructor for Pennsylvania State Extension classes. In 1930 he began his mining career at the Duquesne Light Co's Harwick mine where he was general assistant foreman. In 1941 he went to the Warwick mine as safety engineer where he was later promoted to assistant superintendent. From January to October, 1949, Mr. Stachura worked with the Pennsylvania Dept. of Mines. In October, 1949, he joined Enoco Collieries, Inc. as general superintendent.



Hubert H. Barber has been named to manage Island Creek Coal Co.'s new Guyan Div. Mr. Barber will direct and supervise the operations of the Guyan Eagle Coal Co. Mines No. 1, 4, and 5 and the Elk Creek Coal Co. Mines No. 1 and 4, acquired recently by Island Creek. Presently, Mr. Barber has been serving as a production assistant.

D. R. Dunham has been named manager of the Columbia-Southern Chemical Corp. coal mine at Midvale, Ohio.

Obituaries

A. B. McLaren, 85, who came here from Scotland in 1873 and pioneered in the southern Illinois coal industry, died Jan. 3. An outstanding citizen of Marion, Ill., for more than 60 yr, he had worked for Star Coal Co., Carbon, Ill., early in his career and later was superintendent at Chicago Big Muddy Coal Co. He formed the McLaren Coal Co. which operated mining properties, and also headed McLaren Fuel Co. He was a member of the Marion City Council, an advisor to industry, and active in civic work including, a variety of charities and Scouting.

**X MARKS
THE CRITICAL
SPOTS!**



**It takes
more than muscles to
build a storage bin**

Before the physical work of building a bin begins, we must know the problems involved at the **Three Critical Points**.

- X** What is the loading problem?
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When planning your next storage bin, may we sit in on the very early stages of planning?

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You can always
spot a Neff & Fry Bin
by the shape of
the staves

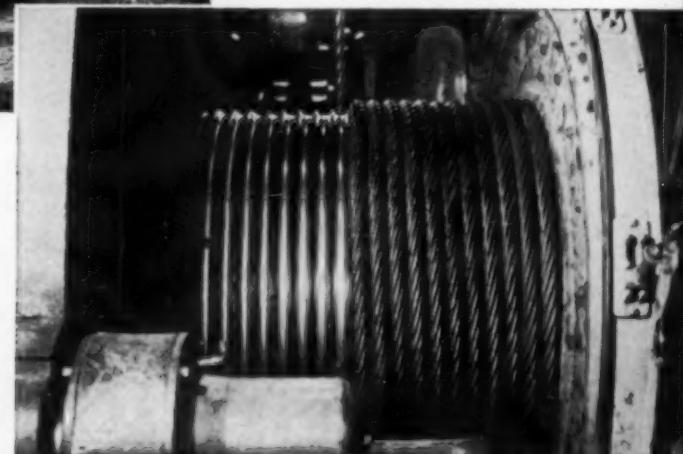


Little Sister Shovel has big "muscles" of Tiger Brand, America's No. 1 Wire Rope

This 40-cubic-yard shovel, owned by the Truax Traer Coal Company, has been removing overburden at the Little Sister Mine near St. David, Illinois, for more than nine years. The hoist line is a 550-foot, 2½-inch diameter Tiger Brand Wire Rope, and the four boom supports are also Tiger Brand.

During this period, millions of cubic yards of rock and earth have been moved, and the Tiger Brand Wire Ropes have given long service life and dependable operation.

Since this 40-cubic-yard shovel went into service, we have seen the size of big shovels advance to 55, 60 and 70 cubic yards . . . and most of these big



2½" Tiger Brand hoist ropes
going through the boom point
sheaves.

40-cubic-yard shovel stripping
overburden at the Little Sister
Mine of the Truax Traer Coal
Company, St. David, Illinois.

Main hoist drum with well-lubri-
cated Tiger Brand Rope in excel-
lent condition after long service.



American Steel & Wire
Division of



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Coal Abroad

Germany Faces Coal Surplus Head-on

Accumulation of huge stockpiles of hard coal and coke in West Germany which hurt the economy badly during 1958 has reached the stage where crisis measures may be invoked. Stockpiles have reached 14 million tons and with miners claming on one side and producers on the other, things seem to be coming to a head.

Blame for the situation is heaped chiefly upon low-priced foreign coal imports and cheaper-than-coal oil, but this does not complete the picture. In fact, it is estimated that in 1959 supply of Ruhr coal would exceed demand by 6 million tons even if not a single ton of U. S. coal were to be imported.

Sever Contracts—The West German government recently proposed that existing contracts with U. S. coal suppliers should be either cancelled or spread over a long term. The U. S. government

filed formal protest to make it clear that such an action would be virtually a complete embargo involving the loss to U. S. coal exporters of about 40 million tons. Nothing further has come out of Bonn on their plans, but general opinion is that the German government will go through with its plan to cut imports despite having to pay U. S. exporters a breach of contract penalty said to be in the region of \$4 to \$5.

More Remedies—Other measures suggested are aimed at eliminating the competition existing between coal and oil (particularly German-produced fuel oil). In the past, German fuel oil has been exempted from a turnover tax in order to encourage local production, but if officials get their way domestically-produced fuel oil will in future have to bear the additional burden of a 4% tax. The oil industry has been per-

suaded to give an assurance that its products will not be sold at less than world market prices during the next two years.

By transferring large inventories of coal from mounting pithead stocks to consumers' yards, West German Economic Minister, Ludwig Erhard, is hoping to pull the wool over the coal industry's eyes and 'lulling' it into imagining that coal sales are at last on the way up. During 1959, the German Federal Railways will accept delivery of an extra 1.2-million tons of coal despite the fact that its steam locomotives are slowly but surely being ousted by modern diesel and electric locomotives.

Next year, the 180,000-man strong German army will have to stock an extra million tons of coal shovelled onto its doorstep by Minister Erhard in his efforts to reduce the biggest-ever stock of pitched coal. A further incentive proposed by Erhard to 'soft-soap' the coal industry has been to offer 10% rebate

NEW easy way to recover roof bolts with **SIMPLEX**

TRIP POST JACK No. M279

- 24" Rack Bar Travel
- High Strength Aluminum Alloy Column and Castings
- Light weight — 72" min. height, weighs only 36 lbs.
- Sizes for all seam heights available

SAFE, EASY-TO-USE...

Two men can recover
350 bolts per day by
using it as follows . . .

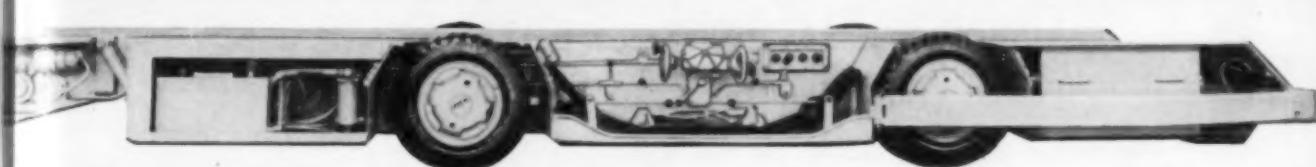
Place a Jack alongside each of the first row of bolts closest to the face. Raise to the roof to provide temporary support. Remove bolts by hand or pneumatic wrench. Stand 25' or more away and pull on a rope attached to the Jack trip lever which collapses the Jack. Move Jack to position under the next row of bolts and proceed as previously.

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2501 Gardner Road, Broadview, Illinois

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MECHANICAL AND HYDRAULIC JACKS

SIMPLEX JACKS
RE-MO-TROL JENNY
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Engineered for Performance in extremely seams



...the NEW

TORKAR® TYPE 26



Boom end of Type 26 TorKar showing wide 56" conveyor

With overall body height of only 25½ inches, this latest model extends the range of TorKar performance to the thinnest commercially-workable seams . . . with every outstanding TorKar advantage retained.

Powered by a single AC or DC motor with efficient torque converter, the Type 26 TorKar has 3-speed forward and reverse transmission, 4-wheel drive, 4-wheel no fight steering, large 3½ ton capacity. For smooth operation, nimble thin-seam performance, rugged construction and long, low-maintenance life in service, choose TorKar Type 26. Write for specifications and prices, or call your National Mine man, today!

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National Mine Service Company

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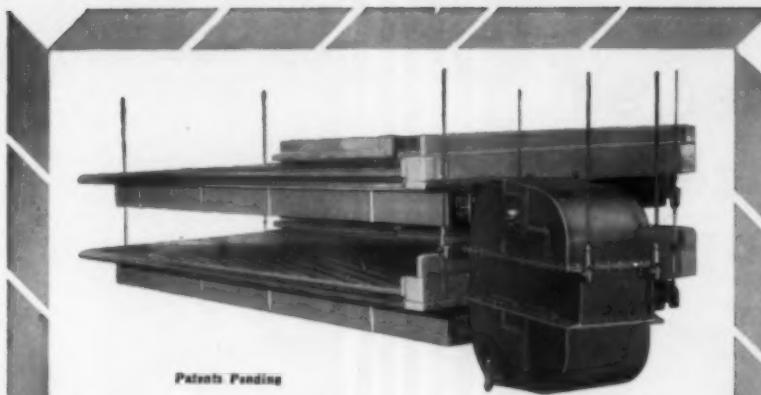
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CONCENCO® "77" Tables Slash Preparation Cost

The cost of preparing coal in the fine sizes has been slashed dramatically by the CONCENCO "77" table. Twin decks not only double the washing capacity in a given unit of floor space, but do it with very little extra power. The two decks are activated by a single synchronized head motion using exactly the same size motor formerly required for the most efficient single deck table operation.

The economy is obvious . . . but consider also the further economy made possible by eliminating the expense of building expansion when unit capacity needs to be doubled. Even when new housing is required, construction may be lighter, less costly, because the floating "77" DIAGONAL-DECK® tables substantially reduce impact to the building. For complete information, send for Bulletin 77.

CONCENCO® Feed Distributor

While unexcelled for feeding coal washing tables, the CONCENCO Feed Distributor effectively provides an accurate splitting of feed into any desired number and proportion of parts to feed circuits or machines in battery for their greater overall efficiency. It is a heavily fabricated all steel machine with motor drive requiring 1 h.p. or less in operation.



THE DEISTER® CONCENTRATOR COMPANY

123 Glasgow Ave. • Fort Wayne, Ind., U.S.A.



★ The ORIGINAL Deister Company • Inc. 1906

Coal Abroad (Continued)

to coal consumers ordering and taking delivery of more coal than they consumed last year.

At the present time, the West-German government is negotiating with East Germany and hopes to persuade the government there to accept delivery of one-million tons of West-German coal to be supplied at a very 'reasonable' price.

Informed circles in the Ruhr see little chance of West-Germany following in Belgium's footsteps. To combat rising stocks of pithead coal, Germany's western neighbor asked the European High Authority for permission to reduce per-ton prices of coal by between 50c and \$2 according to its grade. The new prices became effective on January 1, 1959.

RED CHINA

"Phenomenal" must be the word used to describe Red China's coal production which was recently announced to be 270 million tons for 1958.

Whether or not China's pressurized communes, which require a 17-hr working day and dictate the basic needs of its laboring classes, are responsible for the high rate of production, the results are still amazing and frightening.

A few years ago Red China's pass word was "overtake Britain in coal production in 15 yr." But they have accomplished just this in a much shorter span of time. Britain's production having dwindled to 215 million tons in 1958.

All this is giving the communists still more confidence. With the knowledge that they can in tonnage at least, regardless of the quality of the coal compete with such world powers as England, they are predicting a jump in production this year to about 380,000,000 tons, and there is some opinion that they may better that.

The average daily output of the 52 state-owned coal mines in December last year, Peking announced, reached 610,000 tons, 97% more than that of a year ago last January. The hydraulic mining method did away with the pick-and-shovel method last summer, reports added.

OVERSEAS FLASHES

FRANCE—Imports of coal, coke and lignite in this country dropped to 20 million tons in 1958 compared to 25 million in 1957. Principal cause was a leveling off in French industrial activity plus heavy stocks held by consumers at the beginning of last winter. Imports from the United States dropped to 2.77 million tons from 8.9 million in 1957. De-

when MINE BELTING

has all these features:

- LONGER LIFE—NO COSTLY REPAIRS
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IN CANADA:

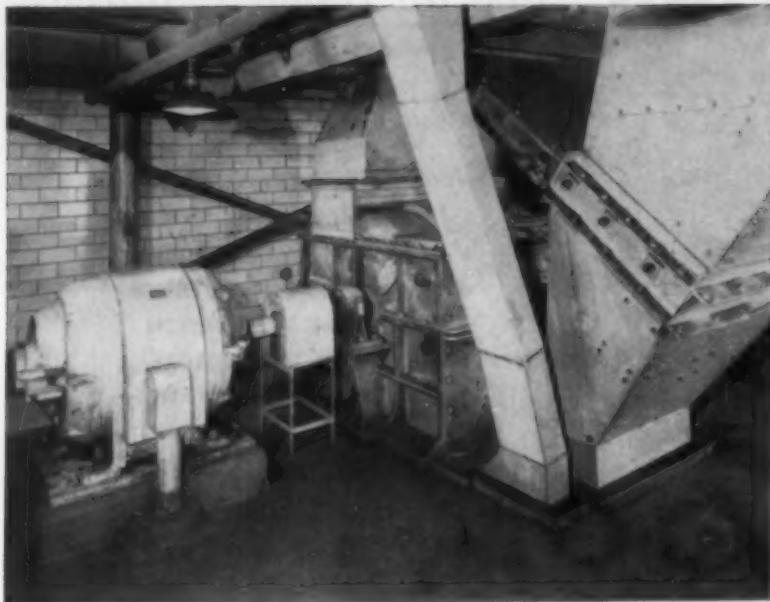
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American "Rolling Ring" Coal Crusher splits coal...smashes maintenance costs!

In almost five years, the above American Coal Crusher has reduced 1,800,000 tons of 2" x 0" coal to a 3/4" x 0" product for a prominent midwestern utility. Since installation, this unit has handled an average annual tonnage of 450,000, with a very low ratio of replacement parts to tonnage. The operating engineer for this utility says, "We have experienced no stoppages...crusher operation and maintenance have been very satisfactory."

"*Rolling Ring*" design makes the difference. Specially designed rotor, consisting of four rows of patented shredder rings, each suspended on a single shaft, rotate freely at a relatively slow speed. Coal is split rather than smashed. This splitting action saves both power and maintenance, gives more uniform sizing, fewer fines. Rings can be reversed to give extended life.

American has manufactured reduction equipment since 1908 and you can be sure that "When you figure costs, the best results come from American *Rolling Ring* Crushers." If you have a coal preparation problem, why not write today for recommendations and literature. Our highly-trained engineering staff will give you prompt assistance.

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Coal Abroad (Continued)

noting increased competition was a rise in imports from the USSR of 90,000 tons, to reach a total of 690,000 tons.

AUSTRALIA—The placement of large Japanese coal orders in Australia and the favorable outlook for further orders from Japan and South America as well as Far Eastern countries will be reflected in large coal mining and loading-equipment purchases in 1959. Australian coal industry leaders plan intensive mechanization and automation to enable them to quote competitive prices for export.

GREAT BRITAIN—The British National Union of Mineworkers has agreed to the National Coal Board's plan to close 36 mines this year, but while doing so advanced some proposals to check further closures. These include: a shorter working week, further cuts in opencast workings, and compulsory retirement of coal miners at 65, with increased pensions. NCB says that 6 more opencast sites are slated for closure in the following year.

POLAND—Pressure of Polish coal on the West European and overseas market may increase if the USSR cancels the purchase of Polish coal during the first years after 1960. The Soviet move in that direction is expected because under the current Russian 7-yr plan, coal, electricity, and the oil and gas industry are expected to make the USSR self-sufficient.

Bituminous Output

YEAR TO DATE	PRODUCTION
Jan. 17, 1959	18,262,000
Jan. 18, 1958	20,946,000
1959 output 12.8% behind 1958.	
A month earlier output was 20.1% behind 1957.	

WEEK ENDING	PRODUCTION
Jan. 17, 1959	8,290,000
Jan. 18, 1958	8,440,000

Anthracite Output

YEAR TO DATE	PRODUCTION
Jan. 17, 1959	1,231,000
Jan. 18, 1958	1,206,000
1959 output 2.1% above 1958.	
A month earlier output was 16.1% behind 1957.	

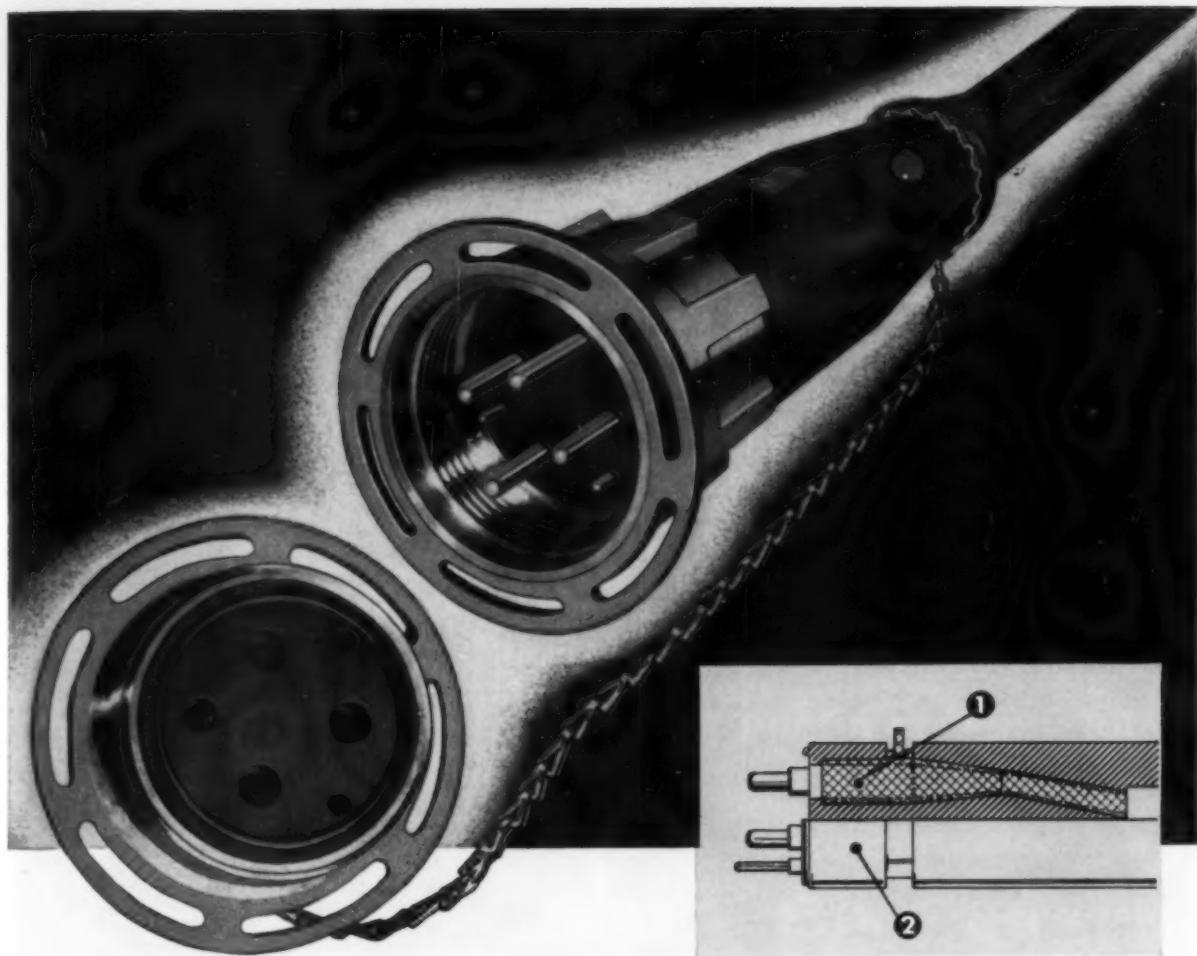
WEEK ENDING	PRODUCTION
Jan. 17, 1959	587,000
Jan. 18, 1958	556,000

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2-STAGE MOLDING ELIMINATES CORONA DAMAGE IN THIS NEW JOY • HIGH VOLTAGE CONNECTOR

The trend toward greater horsepower requirements throughout the industry has created a vital need for high-voltage connectors. High voltages, however, impose added electrical stresses around conductors which can, in time, reduce dielectric strength to the point where efficiency-robbing discharges are often produced between conductors. The result: less efficient operation and shortened connector life.

To eliminate this danger, the new Joy High-Voltage, Multiple-Conductor Connector (for operations up to 7500 v.) is *molded in two stages*. First, as shown in the inset above, a primary (1) molding securely embeds each contact and conductor wiring junction in highly resistant, void-free Butyl. A secondary (2) molding encloses all contacts inside a resilient Neoprene body and permanently vulcanizes

it to its chosen cable. This greater care means longer wear.

Other performance-improving features include a two stage face seal for absolute water-tight connections; ball bearing-mounted coupling with slotted flange for padlocking against unauthorized disconnects; and slip-easy contacts for reduced coupling friction and lower electrical resistance.

Joy 7500 V connectors can be ordered on types W, G, SH-A, SH-B, SH-C and SH-D cables. (Other types, too, subject to factory acceptance). For further details, call your Joy representative or write the Electrical Products Division, St. Louis, Mo., for recommendations and quotations.

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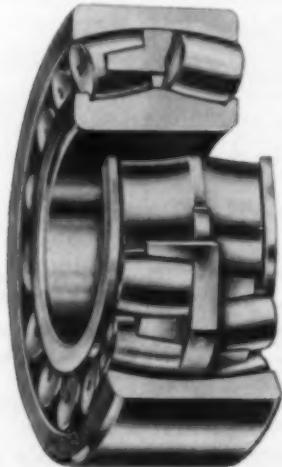
EXECUTIVE OFFICES, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

SKF engineering solves major bearing problems

NEW SPHERICAL ROLLER BEARING SOLVES PROBLEMS OF HIGH LOADS, SPEEDS, AND ECCENTRICITIES IN VIBRATING SCREEN OPERATION

Vibrating screens give bearings a strenuous workout. They subject them to heavy loads, high speeds and eccentric motion.

To overcome these problems, **SKF** has developed a new spherical roller bearing for vibrating



New Series 4523 Screen Bearing

screens in the mining, quarrying, chemical, steel and paper industries.

The new **SKF** Screen Bearings conform to 223 Series Spherical Roller Bearing dimensions. For details on the sizes available, call your nearest **SKF** sales office or authorized **SKF** distributor. Write for Bulletin 466—"Screen Bearings to Meet the Needs of Vibrating Screens."

It's designed to—

1. PROVIDE GREATER LOAD-CARRYING CAPACITY. It gives an average rating increase of 37% and 2.85 times longer fatigue life than the original spherical roller bearing. These increases are obtained by utilizing longer rollers (Fig. 1), closer conformity of roller contour to ring contour.

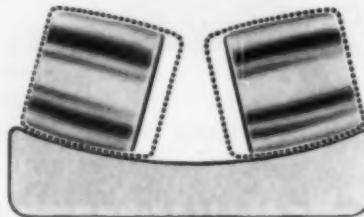


Fig. 1

2. OPERATE AT COMBINED HIGH ECCENTRICITY AND SPEED. This new bearing is equipped with a cage that withstands the stresses and wear caused by combined high operating speeds and by loads resulting from increased eccentric motion of the bearing.

So in this new bearing, **SKF** uses a cage made of centrifugally



Centrifugally cast machined bronze cage

cast bronze having axially drilled and reamed pockets of a shape that conforms closely to the rollers' shape. Its spherical O.D. conforms to the contour of the outer ring sphere. It is symmetrical and made in one piece for dynamic stability. Thus, the cage is centered on large areas of contact located where effective lubrication is assured.

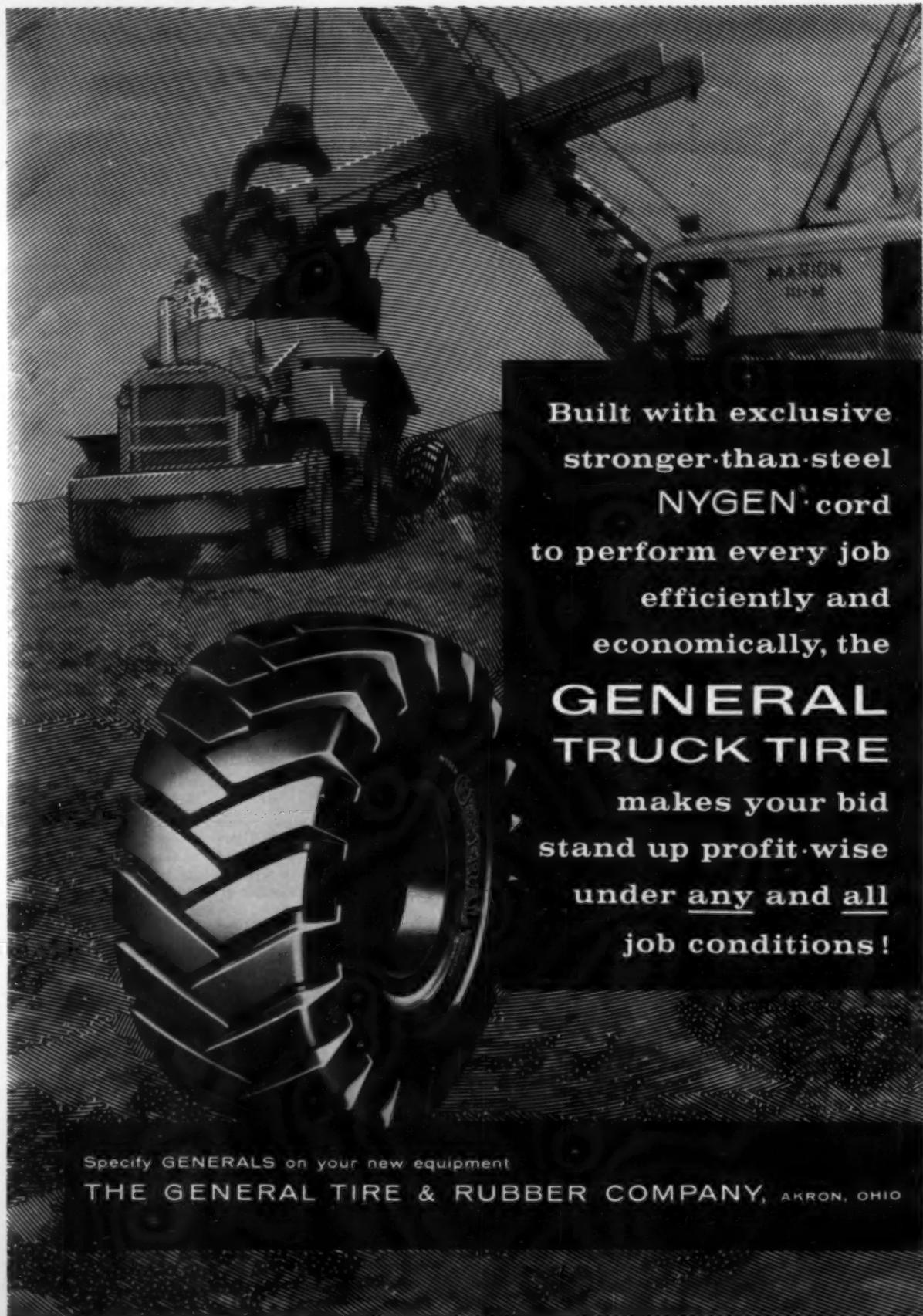


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THE GENERAL TIRE & RUBBER COMPANY, AKRON, OHIO

Current Coal Patents

By: Oliver S. North

Conveyors, J. R. Walker (assigned to Cable Belt Ltd., Inverness, Scotland), Dec. 16, 1958. Improved mine conveyor or system comprising two endless belts feeding one to the other at an angle, and each of the cable circuits supporting one side of both belts. The cables are deflected by means of bend pulleys positioned on the outer side of the cable circuit. No. 2,864,489.

Heavy media centrifugal separating apparatus and method, R. Teuteberg (assigned to SKB Schuechtermann & Kremer-Baum A.G. Fuer Aufbereitung, Dortmund, Germany), Dec. 16, 1958. Method and apparatus for cleaning coal in heavy liquids with the use of centrifugal force. No. 2,864,499.

Mining machine, M. B. Kirkpatrick, Dec. 16, 1958. Design for an efficient burrowing mining machine especially

adapted for working steeply inclined coal seams such as those found in Alaska. The machine is compact, light in weight, and economical of power requirements. This patent covers improvements on the machine described in U. S. Patent No. 2,756,037. No. 2,864,600.

Auger boring head with non-rotating barrel, V. J. McCarthy and G. L. Adams (assigned to The Salem Tool Co., Salem, Ohio), Dec. 16, 1958. Design for a mining machine auger boring head with a non-rotating barrel adapted to guide the head in a straight line into a coal seam and prevent it from traveling downward, upward, or laterally. No. 2,864,601.

Gasification of solid carbonaceous materials, D. B. Eastman and L. P. Gaucher (assigned to The Texas Co., New York, N. Y.), Dec. 16, 1958. A process is described for the generation of carbon monoxide and hydrogen from bituminous coal, lignite or the like without resorting to conventional, and expensive, grinding or pulverizing operations. The relatively coarse coal is admixed with a vaporizable liquid and heated as a confined stream in a highly turbulent flow, whereby the coal is disintegrated and the resultant powdered coal entrained in vapor. No. 2,864,677.

Chain driven belt conveyors, A. W. Duncan (assigned to the Mining Engineering Co. Ltd., Worcester, England), Dec. 23, 1958. Improved tension medium for chain driven belt conveyors comprises cast or forged cable link chains in lengths of at least two cross member spacings with closed links at intervals adapted to receive cross members by quickly detachable means. Thus cross members may be connected into or removed from the chains without disturbing the tension member as such. No. 2,865,494.

Tool-carrying chains, S. E. Proctor (assigned to Austin Hoy & Co., Ltd., Aylesbury, England), Dec. 23, 1958. In a coal-cutter chain, the sprocket-engaging faces on the links are formed on one of the sides of the links between the bases and tool-carrying bosses so as to receive the sprocket teeth in the side of the chain. Links are connected together so as to permit bending of the chain around the sprocket parallel to the plane of the base. No. 2,865,621.

Mining machine provided with adjustable cutting means, S. C. Moon (assigned to The Jersey Mfg. Co., a corporation of Ohio), Dec. 30, 1958. The front end of this mining machine is provided with cutting means which can be adjusted so that the machine will readily follow the path of a coal seam, and



You cut screening costs right from the start, when you use CF&I Wisscoloy Space Screens . . . these rugged, general-purpose space screens are economy-priced.

What's more, you continue to save on cost-per-ton of coal screened . . . because Wisscoloy Space Screens are made to exacting standards, from tough, special alloy steel wire that's tightly woven, carefully crimped. The result is a quality screening that provides maximum accuracy plus long life. Other CF&I Space Screens solve specific coal screening problems:

CF&I Manganese Space Screens — are extremely shock-resistant, last longer on scalping operations and other tough screening jobs.

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There's a CF&I Space Screen designed to meet your coal screening requirements. They're furnished in a wide range of standard dimensions, can be supplied with any specified edge preparation. Contact the CF&I sales engineer in our office nearest you.

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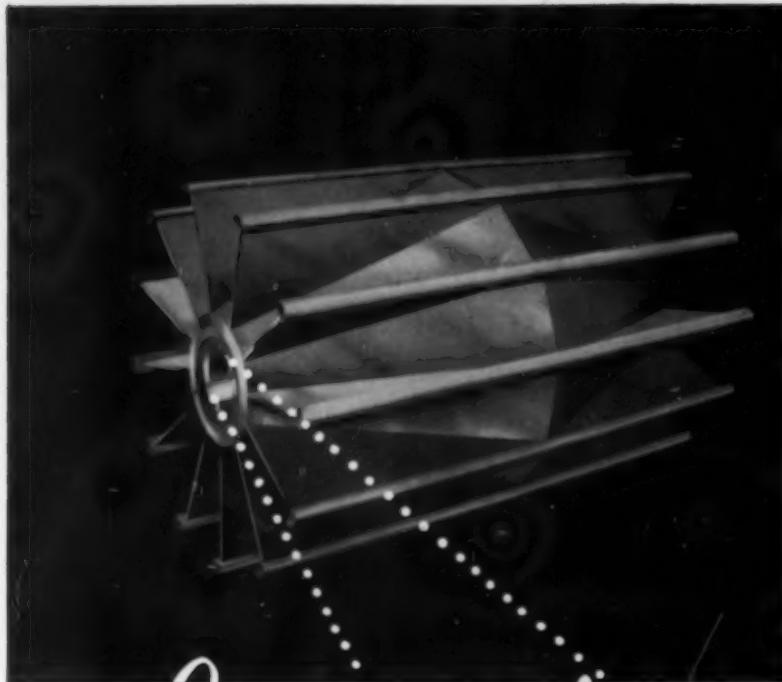
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Continental

Wing Type Pulleys

with

“TAPER-LOCK” HUBS



Welded Steel Wing Type Self-Cleaning Pulleys — now standard with “Taper-Lock” Hubs.

Self-cleaning pulleys prevent belt mis-alignment due to build-up of material on pulley face. “Taper-Lock” Hubs provide the most satisfactory type of clamp hubs at an economical price, giving the equivalent of a shrunk-on fit while permitting easy assembly and disassembly.



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For further information
on Welded Steel Pulleys
write for Bulletin
ID-134.

Patents (Continued)

with an improved drive for operating the cutting devices which is adapted to permit required adjustment of the cutters. No. 2,866,626.

Mine blasts, Anatole a.k.a. Edgard Demeleenne, Jan. 6, 1959. As a safety measure, a blasting cartridge is provided with a watertight translucent casing filled with water or other flame-extinguishing medium and containing a luminous substance therein, to permit the user to determine the presence of the device in a mine hole. Several examples are cited showing the manner of using this device under different conditions and using various reagents. No. 2,867,171.

Conveying apparatus, S. S. Lanier Jr. (small percentages assigned to various assignees), Jan. 6, 1959. A coal mine conveying apparatus comprises an endless belt conveyor propelled by a connecting power-driven head pulley and passing around a tail pulley. The belt is supported on a plurality of wheels contacting the floor. The usual troughing idlers and return rolls are eliminated. No. 2,867,315.

Use of high pressure fluids in coal mines, D. L. Dowie (assigned to Australia Ltd., London, England), Jan. 6, 1959. In this fluid-expansion method for the breaking of coal in mines, the air is compressed to a relatively low pressure at a point remote from the face. At a point adjacent to the working face it is compressed to 4 to 10 times its primary pressure, and delivered to boreholes at the pressure required for most favorable blasting effects. This method avoids use of long lengths of costly high-pressure air lines and the dangers inherent in the presence of such lines in galleries and roadways. No. 2,867,426.

Disintegrating mechanism for longwall continuous miner, J. A. Russell and J. R. Bouille (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Jan. 6, 1959. Attacking mechanism for a continuous miner, whereby the passageway formed in the seam is of such size and shape that the machine may advance into it. No. 2,867,427.

Earnings Reported

Consolidation Coal Co.—Total 1958 production, 28 million tons compared to 39.8 million in 1957. Net income after taxes—\$18.5 million, down from \$26,673,000 in 1957. Earnings per share—\$2.01 against 1957's \$2.90.



He
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He pinpoints faults with an O-B Locator!

When a fault hits his trailing cable, he wastes no time. He pulls the plug and goes for his O-B Cable Fault Locator.

It takes him only a minute to clip two leads to the power conductors, two to the small six-volt battery—and he's ready for testing. Testing is simple too—a slow walk back along the cable with earphones and slim transistor receiver. When he hears a change in signal he's found the short or open and can make repairs.

If you've been wasting too much time tracking down hidden faults, you could use an O-B Locator, too. It's pocket size, weighs only four pounds, costs less than any cable you'll use it on. Send for Booklet K-423 for complete information.

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Top holding power.

Here's what happens when you spin an O-B Expansion Unit on a bolt, shove it up the bolt hole, and put a wrench on it:

1. Expansion begins immediately. The bolt turns easily because plug threads are lubricated with rust preventative before shipment. The unit itself stays put because the serrated flexible fingers of the shell are slightly pre-expanded to grip the wall of the hole even before expansion begins.
2. Expansion builds up fast. The tapered O-B plug quickly expands the four shell fingers in four directions into the roof, creating a strong socket anchorage with tremendous holding power.
3. Expansion stays put. Expansion pressures are distributed evenly over four shell fingers, reducing unit stresses to a minimum. This means maximum strength in hard top, maximum "purchase" in soft yielding top.

For top holding power—in any top, more bolting crews use O-B Shells and Plugs than any other type of expansion unit. You can order them, as they do, from the catalog numbers shown below.



O-B Standard
21889—for $\frac{3}{4}$ -inch bolts
21890—for $\frac{5}{8}$ -inch bolts



O-B Bail-Type
22378—for $\frac{3}{4}$ -inch bolts
22463—for $\frac{5}{8}$ -inch bolts

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AW-22

It's easy to see why so many experienced bond welders prefer the AW-22 long bond. It takes only one or two hammer blows to set that husky clip on the rail base—you don't have to hold it as you strike the arc. It can be installed above or below the rail base with equal ease—either way there's plenty of room for the welding rod and a broad, wide-open angle between terminal and rail in which to lay a bead.

The size of the terminal, the weld area, and the extremely short distance between rail and copper strand makes the AW-22 as sound electrically as it is mechanically. The welder shown below is applying one with an O-B Welder, a compact, rugged, resistance-type welder for bonding and general shop use.

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PYROPRENE*

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Here's one overhead that runs up big profits

This Acme-Hamilton 48-in. conveyor belt, on a Goodman Rope-belt Conveyor is carrying coal at 1500 tph with low maintenance costs and long service life. Note how nicely the belt troughs under the bulky load—and how flat it runs between the return idlers...sure signs of excellent construction and fine quality.

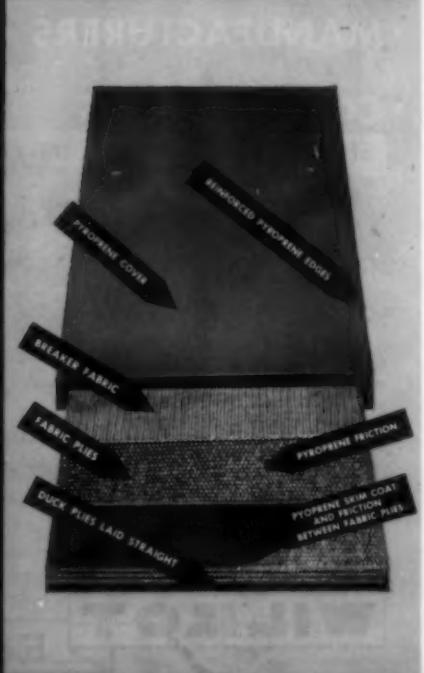
PYROPRENE PROTECTED against fire, Acme-Hamilton U.S.B.M. accepted belts will not feed or spread fire. The cover is fire-resistant Pyroprene; fabric plies and breaker fabric are encased with Pyroprene compound before the belt is built. Cover has exceptional resistance to abrasion and cutting. Write Acme-Hamilton Dept. CA-91.

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News Roundup (from p 28)

Disaster Causes

An explosive charge which shot through into freshly removed coal in another entry and ignited recently liberated methane gas caused the Oct. 27, 1958 mine disaster at McDowell County mine, W. Va., in which 22 men died.

The State Mine Dept. reached this conclusion after investigating the blast that occurred in Bishop No. 35 mine of Pocahontas Fuel Co. The investigators theorized that the shot foreman charged the blasting holes and shot the coal in the slant entry immediately after a machine crew finished cutting operations in the slant.

"He then went to No. 6 which was ready to be shot, connected the shooting cable to the leg wires, went around the corner into No. 7 entry, and proceeded to shoot No. 6 entry," the investigation report summarized. "One or more of the charges shot through into the freshly shot coal in the slant entry and there ignited the recently liberated methane."

The investigation went on to recommend that thought and study be given to other methods of shooting coal in the mine which is classified as gassy by both the West Virginia Dept. of Mines and the Federal Bureau of Mines. It normally employs about 457 men on three shifts. There were 207 in the mine when

the blast took place. Another explosion on Feb. 4, 1957, killed 37 men.

Burton Mine—Another accident, which took place the following day at the Oglebay Norton Co.'s Burton coal mine near Craigsville, W. Va., resulting in the death of 14 men, has been attributed to ignition of explosive gas by an electric arc or spark by the Bureau of Mines.

The formal report on the disaster said that a large quantity of methane, released from formations in the roof by large falls or emitted from heaving bottom in the active workings or in abandoned areas next to active workings was ignited in the active working area. It stated:

"Gas accumulated in these working areas when the ventilating current was short-circuited out by the active workings by the removal of stoppings from crosscuts between the 15 left entries."

"The gas was ignited by an electric arc or spark initiated when a roof fall caused the power wires in No. 2 entry to contact the return conductors or the frame structure of the belt conveyor.

"Coal dust in the face regions slightly entered into the explosion and aided in its propagation."

Mine Safety Tops

The Illinois mine safety record for 1958 was the best in the history of the state, Gov. William G. Stratton an-

nounced recently, after extensive review.

He said that since records were first kept, in 1882, there was an unprecedented period of 174 days beginning Feb. 21 and ending last Aug. 14, without a single fatality. Over this period 15,563,797 tons of coal were mined.

A report by the state Dept. of Mines and Minerals also listed last October as fatality free. The 4,244,884 tons mined that month made an annual production of 19,808,681 tons of coal without a death.

Modern Coal Story

Publication of a special one-issue magazine, "Keystone Modern Coal Story," has been announced by Keystone Coal Buyers Manual, a McGraw-Hill publication.

Taking its theme from McGraw-Hill's "Plan '59—Modernize Now for Growth and Profits," it emphasizes basic factors favoring coal as the fuel choice for industrial and institutional boiler plants. It particularly suggests coal as the choice of fuels in areas of modernization, conversion and expansion.

Subjects treated include: fossil fuel reserves and availability; stabilization of coal prices by heavy spending for modernization and increased production efficiency; comparative fuel costs study by

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of coal preparation plants and equipment since 1908



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Now Piggyback!

KERSEY'S "OPERATION PIGGY-BACK" CUTS DOWN SUPPLY HANDLING COSTS AT LARGE MIDWEST MINE

Supplies loaded once at supply yard—unloaded at point of use . . . it's that simple, quick and economical!



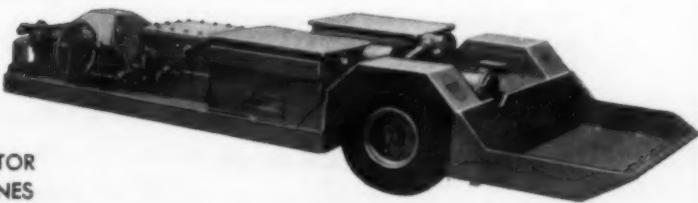
Model 612



KERSEY MODEL 844 —
IDEAL FOR PULLING SUPPLY AND
MAN TRIP CARS IN LARGE MINES

Heavy duty, 4-wheel drive, 4-wheel steer and brake tractor — weighing 8,300 lbs.

Supplies are loaded by forklift truck at supply yard onto Kersey Model 612 Rubber Tired Supply Cars mounted piggy-back fashion on 5-ton rail dollies. Forklift truck shifts rail dolly loads to top of mine slope where they are lowered to bottom. Here they are met by Kersey Rubber Tired Battery Powered Tractor which takes supply cars from rail dollies into the face area where supplies are dropped off at point of use.



PPC-10

KERSEY PPC-10 PERMISSIBLE
PERSONNEL CAR AND UTILITY TRACTOR
HAS MANY USES AROUND COAL MINES

Used as mechanics car, supply truck or as an emergency vehicle. Rear cargo deck will accommodate stretcher to take injured personnel out of mine. Detachable cargo compartment has 2,000 lb. capacity for supplies. Unit can also double as tractor for towing supply and man trip cars.



CLIP AND MAIL TODAY

Kersey Manufacturing Co., Inc.
Bluefield, Virginia

- Send Information on Kersey 844 & PPC-10 Tractors.
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Company _____

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News Roundup (Continued)

areas and cities; the growth pattern of major coal companies; research and development of new efficient coal-burning and coal-handling equipment; fuel design trends of new plants in 1952 to 1958; study of space heating markets and case histories of four recent boiler room modernizations which have paid off in areas of fuel cost; and increased efficiency in plant production.

The new publication is available at \$1.00 per copy. Orders should be placed with Keystone Coal Buyers Manual, 330 W. 42nd St., New York 36, N. Y.

Buys Equipment

The Youghiogheny & Ohio Coal Co. has purchased a highly automatic dumping system from the Nolan Co. for its Nelms No. 2 mine at Hopewell, Ohio.

The order includes a completely automatic dump, trip feeder, loaded car trip hiker and empty car trip hiker.

The loaded car trip hiker will be installed back on the loaded track to bring up the next loaded trip to the rotary dump. The empty trip hiker will move out the empty trip on a side track where it will be picked up by the haulage locomotive.

The mine cars will be 12-ton capacity with modern eight-wheel design. Tonnage dump with the new Nolan equipment will be 550 tph.

Tax Cut Allowed

Glen Alden Corp. has accepted a settlement on its appeal for a lower assessment of its land value in Wilkes-Barre, Pa., and surrounding communities.

The settlement called for a \$3,475,420 reduction in the firm's 1958 coal land valuation, which represents 11.85% of the original assessment of \$35,000,000. An other 11.85% reduction will be allowed in 1959, creating a total drop in valuation of 23.70%. The firm was also allowed a 2% discount on payment of 1958 county taxes.

Originally, a \$19,500,000 reduction amounting to 60% of their total coal land assessment had been asked by Glen Alden. It stressed such factors as the depressed anthracite market, the necessity for further employment and payroll reductions if tax relief was not provided, and the high ratio of assessed value to market value at which they were assessed compared to the lower ratios at which other taxpayers in the same taxing districts were charged.

Supervisor Fined

Thomas Jones, superintendent of the Marianna mine, Marianna, Pa., when an explosion and fire killed six miners Sept. 23, 1957, recently pled no defense to charges of involuntary manslaughter and violation of state mining laws.

Mr. Jones, since retired, appeared before Judge David H. Weiner in Washington County Court and was fined \$300 and ordered to pay court costs. Charges against seven other supervisory employees of the mine were dismissed.

Mines Companies

Mark Twain Coal Co., Moberly, Mo., has been sold to the Boss Fertilizer Co., also of Moberly.

Boss took over the equipment of the coal company and has been moving operations to the plant in north Moberly. Ward Hayden, who has been president of Mark Twain, will become vice president of City Bank & Trust Co.

Fire caused damage estimated at between \$250,000 and \$350,000 at the Pine Township Coal Co., near Heilwood, Indiana County, Pa.

The tipple and cleaning plant were completely destroyed but employment is not expected to be affected as the coal will be taken temporarily to the com-

GOT WATER?

GET
FLYGT

...THE 24-HOUR PUMP

Reasons for the world-wide success of FLYGT B-80L pumps:

- Electric, fully submersible, fully portable (185 lbs)
- Instant pumping — no priming, no installation
- Runs dry without damage
- Takes high proportion of solids
- Practically no maintenance or supervision
- Frost- and fire-proof
- 6 hp, 3" hose, 330 GPM, max. head 170 ft.

Also: FLYGT B-38L — 1.8 hp, 75 GPM, 70 lbs, max. head 90 ft., 1½" hose; FLYGT B-80 Marine — 6 hp, 330 GPM, max. head 145 ft., 3" hose; FLYGT B-150/200L — 65 hp, 3,000 GPM, max. head 220 ft., 6" or 8" hose, 1,200 lbs.

Higher heads with FLYGT pumps in tandem.



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**Flygt pumps are sold and serviced
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USER SATISFACTION

Maintaining steady production at Ayrshire Collieries Corp. Harmattan Mine

Stripping 80' or more of overburden to reach the coal seam is a rugged job

at Ayrshire's Harmattan Mine near Danville, Ill. Two Bucyrus-Erie walking draglines with 25 yd. and 30 yd. buckets are handling the job. Both rigs are equipped with

Yellow Strand Wire Rope—including 2" twin hoist lines, right and left long lay 2½" drags and 1½" dump lines. At last report, Yellow Strand

Wire Rope was giving excellent yardage, and was still going strong.

LONG LIFE...LOW OPERATING COST... are the reasons for this Yellow Strand preference.

To take advantage of this extra value, call your Yellow Strand

Wire Rope distributor today!

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Yellow Strand.



WIRE ROPE



SLINGS



CLIPS

Mines, Companies (Continued)

pany's No. 2 cleaning plant, built in 1957.

Utilization

Pennsylvania Electric Co. will step up its use of coal by 50% within the next 2 yr, according to its president, Louis H. Roddis, Jr.

The firm consumed 2 million tons during 1958. The 50% increase, to 3 million tons annually, is expected as a result of

new generating units going into operation.

Chances of getting an experimental plant to convert coal into heating gas or gasoline have been under discussion at the Bureau of Mines.

Reports indicate that certain Kentucky groups want such a plant for the Hazard-Paintsville coal area in eastern Kentucky. It would use atomic fuel to convert coal into petroleum products.

An experimental shipment of East Kentucky coal in 20 phosphate cars may spark a rail transport two-way haul of

major economic importance to the Tennessee Valley.

The experiment by the Louisville and Nashville railroad and a Nashville coal mine operator is an attempt to discover whether the thousands of specially built freight cars which haul Florida phosphate to the Midwest can haul Tennessee Valley coal back to Florida.

The City-County Air Pollution Control Board has decided not to regulate the sulphur content of coal burned by Louisville, Ky., industry.

This is the second time the Board has made such a ruling since a coal product, sulphur dioxide was labeled last May the biggest single air pollutant over the city. Researchers who studied the problem recommended that coal with a lower sulphur content be burned, but the board vetoed the suggestion, stating that the cost to industry, close to \$3 million, was not warranted by the conditions.

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CORPORATION
PARIS, KENTUCKY**

- SCHROEDER BROTHERS, Exclusive Eastern Sales Agent, Pittsburgh, Pennsylvania
- UNION INDUSTRIAL CORP., Carlsbad, New Mexico
- SALMON & CO., Birmingham, Alabama
- WESTERN SALES ENGINEERING CO., Salt Lake City, Utah

Meetings

ASME Lubrication Div. Spring Conference, March 16, 17—Franklin Institute, Philadelphia, Pa. Symposium and formal papers on "Wear of Lubricated Surfaces."

Colorado School of Mines, Third Symposium on Rock Mechanics, April 20, 22, at the Colorado School of Mines, Golden, Colo. Themes are Seismology and Explosions, Nuclear Blasts in Mining, Factors Common to Soil Mechanics and Rock Failures, and Factors Common to Commutation, Underground Failures, and Failures Resulting from Explosions.

Appalachian Underground Corrosion Short Course, June 2, 3 and 4, at the University of West Virginia, School of Mines, Morgantown, W. Va. Theme—technical and non-technical presentations of practical and theoretical aspects of corrosion.

Equipment Approvals

Sixteen approvals were issued during December.

Joy Mfg. Co.—Type DM-2WD drillmobile; three motors, two 10 hp and one 5 hp, 220 and 440 V, AC. Approvals 2F-1413 and 2F-1413A, Dec. 1.

Joy Mfg. Co.—Type 6SC5PHH/PXHH shuttle car; three motors, two 20 hp and one 15 hp, 415 V, AC.

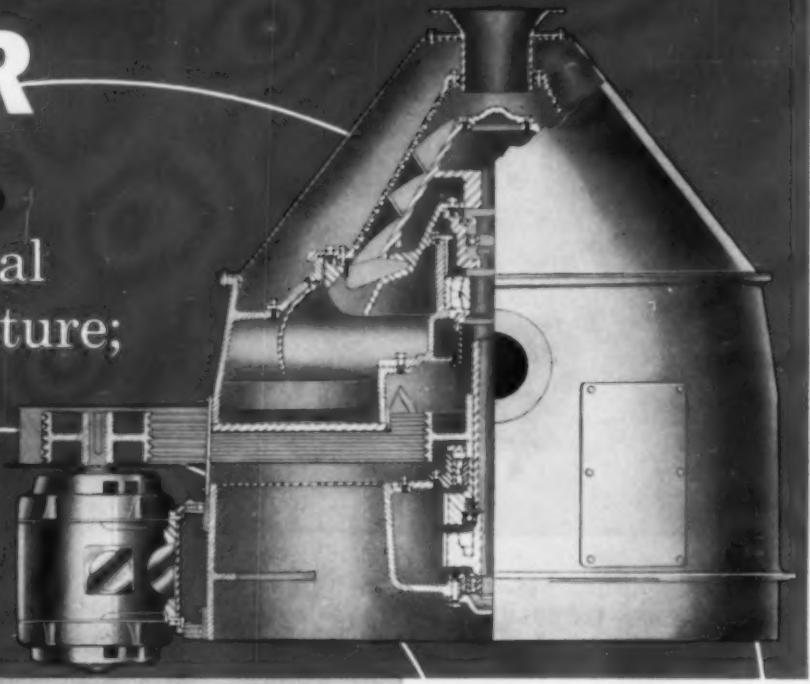
(Continued on p 67)

CMI

CONTINUOUS CENTRIFUGAL

DRYER

designed to
dewater coal
to 5% moisture;
high
rated
capacity



Accepted as standard equipment by most of the country's leading mines. Lowest power consumption...lowest maintenance cost...lowest "per ton" cost. Periodic inspections furnished and emergency service available from strategic locations.



Brochure No. E-36 giving complete details
available upon request.

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PROJECT PAYDIRT pays off for you

NEW CAT D8

PUSHLOADING: PRODUCTION UP

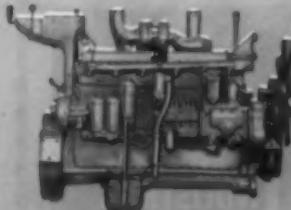
The new Caterpillar D8 Series H Tractor is ready *now* to increase its lead as undisputed king of its size class. A major achievement in Caterpillar's all-out research program, "Project Paydirt" (see box), the new D8 has been proved through a rigorous field testing program.

This D8 is new in design, appearance and performance. It is bigger, more powerful. It incorporates new engineering advances. It is easier to operate.

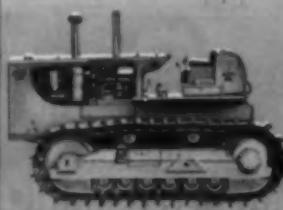
Now—what can it do for you? Here's the answer:

The D8 has been thoroughly field tested on actual jobs. Several of the big new tractors have been at work constantly in every kind of material. Out of the statistics developed, both pushloading and bulldozing production figures are *up*.

This means that you can move dirt faster and cheaper than ever before with a tractor in this size class. You



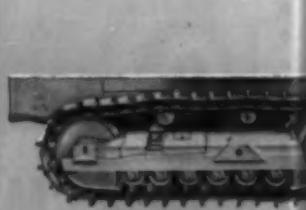
HORSEPOWER INCREASED 18%. The horsepower of the new D8 is up from 191 to 225 at the flywheel, from 155 to 180 at the drawbar. In addition, engine torque rise now is 20%, an increase of one-third. Over-all engine performance has been greatly improved by the addition of a turbocharger.



SIZE INCREASED. To make effective use of the new horsepower, over-all weight of the tractor has been increased 4,400 lb. to a total of 47,000 lb. At the same time the gauge has been increased to 84 inches, track on ground lengthened to 114 inches, square inches of contact increased to 5,505.



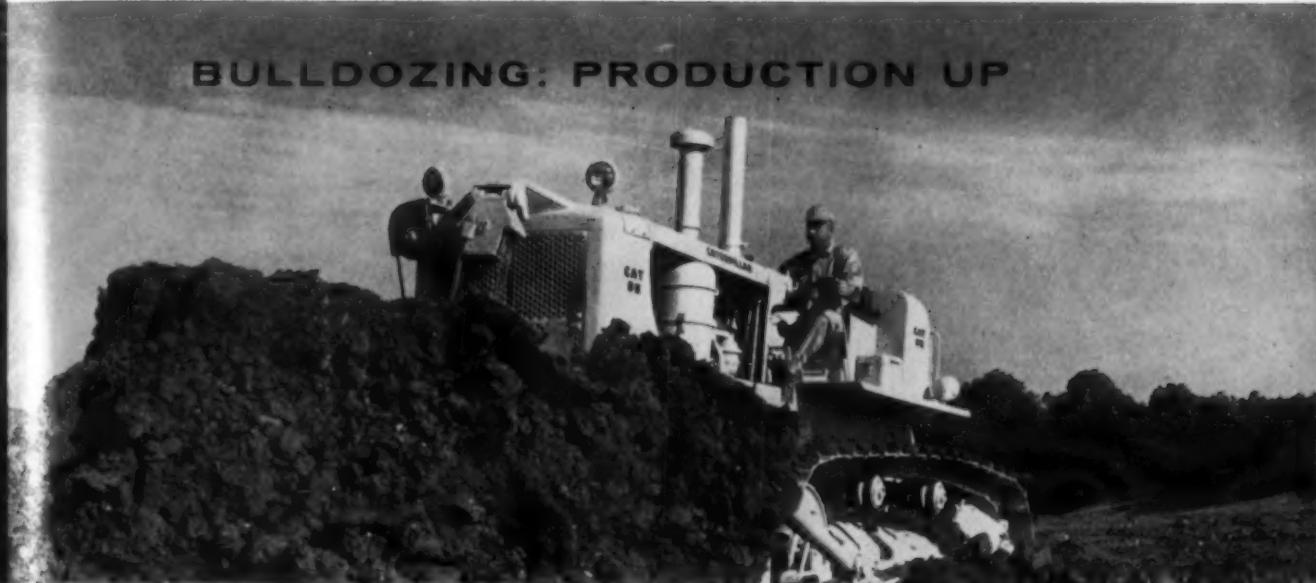
LIFETIME LUBRICATED ROLLERS AND IDLERS. That's right—*lifetime!* In a major research breakthrough, Caterpillar has achieved track and carrier rollers and idlers that never require further lubrication until rebuilding. And service life is hundreds of hours longer than with ordinary rollers.



NEW, STRONGER, HEAVIER UNDERCARRIAGE. Every component, such as frames, links, braces, pins, bushings, shoes, has been made stronger by the use of improved materials and heat treat processes to provide longer life. And ground clearance has been increased 50% to almost 20 inches.

D8 SERIES H TRACTOR

BULLDOZING: PRODUCTION UP



answer:
an actual
at work
the statis-
ng pro-
cheaper
ss. You

get higher production, bigger profits—yet the new D8 is actually *more economical* to own and operate!

But find out for yourself. Get the full story from your Caterpillar Dealer, all the eye-opening facts and figures that can only be touched on briefly here. Then see this great new machine at work on your operation as soon as possible. You can't afford not to!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.



UNDERCAR-
such as
bushings,
er by the
and 'heat
nger life.
been in-
ches.

DRY-TYPE AIR CLEANER. Here's still another major Caterpillar research development on the new D8—the new dry-type cleaner which removes 99.8% of dirt in the intake air, even under severe operating conditions. The new cleaner can be serviced in 5 minutes, costs a good deal less to use.

SUPERIOR OPERATION. Operator visibility is excellent because of higher deck and changed seat position. Console-type controls make operator's job easier. And on torque converter models, standard foot-operated decelerator can override hand throttle—free operator's hands for other controls.

CATERPILLAR

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BORN IN RESEARCH...
TESTED IN THE FIELD

TWO MORE IMPORTANT OPERATOR CONVENiences

HIGHER SPEED. Completely new, long-life, direct drive transmission provides six speeds forward and six reverse. High speed has been increased to 6.3 MPH forward, 6.4 reverse to reduce cycle time. Operator can shift from any forward gear into a similar reverse gear (or vice versa) by simply moving the forward-reverse lever.

DEPENDABLE OIL CLUTCH. By contractor and operator demands, the virtually service-free, easy-to-operate oil clutch has been retained in the new D8. Another important Caterpillar exclusive.



PROJECT PAYDIRT: Caterpillar's multi-million-dollar research program—to meet the coming challenge of the greatest construction era in history with the highest production earth-moving machines ever developed.



Okocord Red Saddle twin Type W cable in action on loader and shuttle car at Intermountain Chemical Company's trona mine. Secret of Red Saddle's added strength and security against short circuits is the pre-formed, red neoprene protective wall between the conductors, and the compact construction in which all components are locked together for maximum ruggedness.

They've cut mining costs with tougher cables

"We've found that the longer life of Okocord cables means lower operating costs for us," says Jack Wilson, Maintenance Supervisor for Intermountain Chemical Company of Westvaco, Wyoming. "Our mining operation is almost 100% electrified. We need cables that can stand up to extreme abuse. Okocord mining cables have everything it takes to prevent work stoppages that waste man hours or immobilize expensive equipment." They're tough, highly

flexible, and unaffected by oils, acids, alkalies or mine water.

On its shuttle cars—key to continuous, efficient operation—Intermountain finds that Okocord Red Saddle twin cable stands up best to high-speed reeling and unreeling . . . to being stretched tight against sharp tunnel wall corners . . . to frequent cable runovers . . . and to pulling and stretching. Says Mr. Wilson: "Okocord Red Saddle shuttle car cable minimizes internal shorts due

to cable abuse."

There are Okocord quality cables to keep your mining equipment operating efficiently: shovels, drills, cutting equipment and other machinery. There are Okonite specialists ready and willing to help you in planning new cable systems. And there is an illustrated, 76-page booklet on mining cables that's free when you write for Bulletin CA-450, The Okonite Company, Passaic, New Jersey.



where there's electrical power . . . there's **OKONITE CABLE**,

Equipment Approvals (Cont.)

Approval issued 2F-1414A, Dec. 2.

Long Co.—Type MBC-2 mobile bridge carrier with PT-18 or PT-218 piggyback conveyor; two or three motors, one 40 hp and one or two 5 hp, 220 and 440 V, AC. Approvals 2F-1415 and 2F-1415A, Dec. 3.

Jeffrey Mfg. Co.—Type ML-81C loader; five motors, four 15 hp and one 4 hp, 250 V, DC. Approval 2F-1416, Dec. 4.

Jeffrey Mfg. Co.—Type MT66 shuttle car; three motors, each 15 hp, 250 V, DC. Approval 2F-1417, Dec. 5.

Getman Bros.—Models KD-52, KD-52R, KD-70, and KD-70R ore carriers with Deutz Model FIL/612 diesel engine and Getman conditioner. Approval 24-20, Rec. 12.

Goodman Mfg. Co.—Type 2420 cutting machine; two motors, one 60 hp and one 40 hp, 440 V, AC. Approval 2F-1418A, Dec. 10.

Goodman Mfg. Co.—Type 425 continuous borer; one motor, 250 hp, 440 V, AC. Approval 2F-1419A, Dec. 12.

Joy Mfg. Co.—Type XB30R-9H extensible belt conveyor; three motors, two 15 hp and one 40 hp, 440 V, AC. Approval 2F-1420A, Dec. 17.

Goodman Mfg. Co.—Special 400 continuous borer; two motors, one 250 hp and one 50 hp, 230 V, DC. Approval F-1421, Dec. 17.

Columbus-McKinnon Chain Corp.—Type CF-5P feeder conveyor; one motor, 30 hp, 240 V, DC. Approval 2F-1422, Dec. 17.

Chicago Pneumatic Tool Co.—Type R8D-30-S-579 self-propelled roof-bolting drill; three motors, two 1/2 hp and one 2 1/4 hp, 250 and 550 V, DC. Approvals 2F-1423 and 2F-1423A, Dec. 17.

Long Co.—Type LDRB drill and roof bolter; two motors, each 5 hp, 230 V, DC. Approval 2F-1424, Dec. 19.

Goodman Mfg. Co.—No. 27407 bridge conveyor; one motor, 5 hp, 250 V, DC. Approval 2F-1425, Dec. 22.

Henger-Seltzer Co.—Models A2M, 2-cell, and A3M 3-cell, Lennan flashlights. Approval 10C-623, Dec. 22.

Joy Mfg. Co.—Type 6CM-1AH continuous miner; seven motors, three 15 hp, two 15 or 30 hp, and two 100 hp, 440 V, AC. Approval 2F-1426A, Dec. 31.

Preparation Facilities

Mathies Coal Co., preparation plant, Finleyville, Pa.—Contract closed with Fairmont Machinery Co. for clean coal crushing facilities, raw coal crushing facilities and additional fine coal cleaning facilities, all as addition to present plant. Completion scheduled for first half of 1959.

Beckley Coal & Coke Co., Jerryville, W. Va.—Contract closed for alterations to present Chance cone plant. Completion scheduled for first quarter, 1959.

Lester Smokeless Coal Co., Beckley, W. Va.—Contract closed with Wilford L.

Roller Co. for a Roller prefabricated heavy-media washer to clean 50 tph.

Glosser Coal Co., Johnstown, Pa.—Contract closed with the Wilford L. Roller Co. for preparation facilities to handle 100 tph of ROM bituminous coal, including a Roller prefabricated heavy-media washer, scalping screen and conveyors, Syntron feeders and sizing screens. Completion scheduled for April, 1959.

Pais Pocahontas Coal Co., Keystone, W. Va.—Contract closed with Wilford L. Roller Co. for a Roller prefabricated heavy-media washer to clean 50 tph or 3x 1/4" coal at Pocahontas seams.

GEMCO

MAGNETIC

TROLLEY CONTACTOR



... no other trolley contactor can match the features of this NEW GEMCO

CUTS 95% OF MAINTENANCE

NO FRICTION—The trolley shoe never touches the contactor

UNLIMITED LONG LIFE—Nothing to wear out because there is no physical contact between the contactor and trolley

NO REBOUND POSSIBLE—No false signals or switch operation from contactor rebound as is common with mechanical types.

OPERATES AT ANY SPEED—No train is too slow or too fast to allow positive operation

POSITIVE DIRECTION SENSING—Directional control circuits are made in a quick, positive and dependable manner.

NO BURNED OUT COILS—Unique circuitry prevents the burning out of control relay coils often caused by the locomotive stopping on the contactor.

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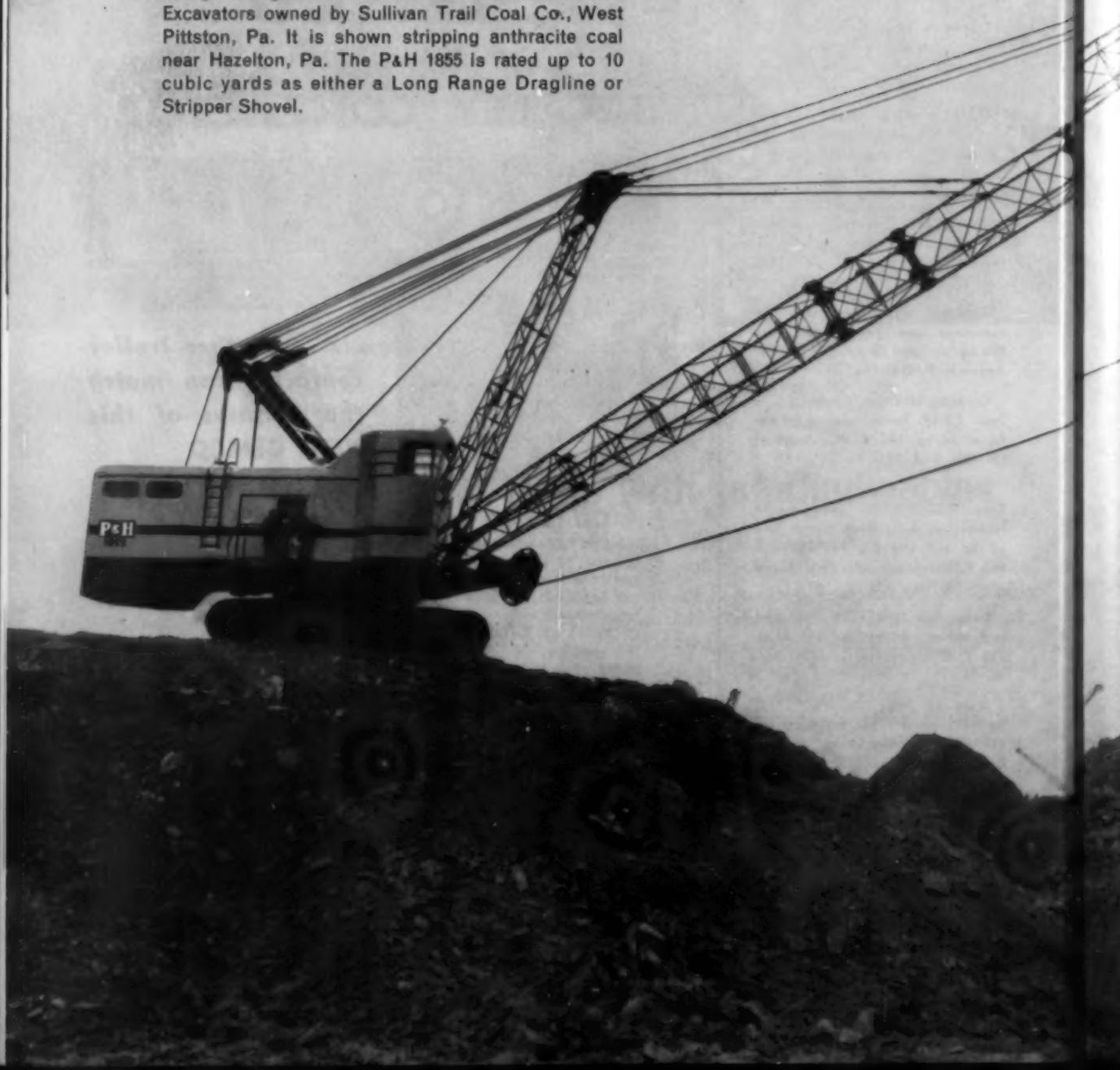
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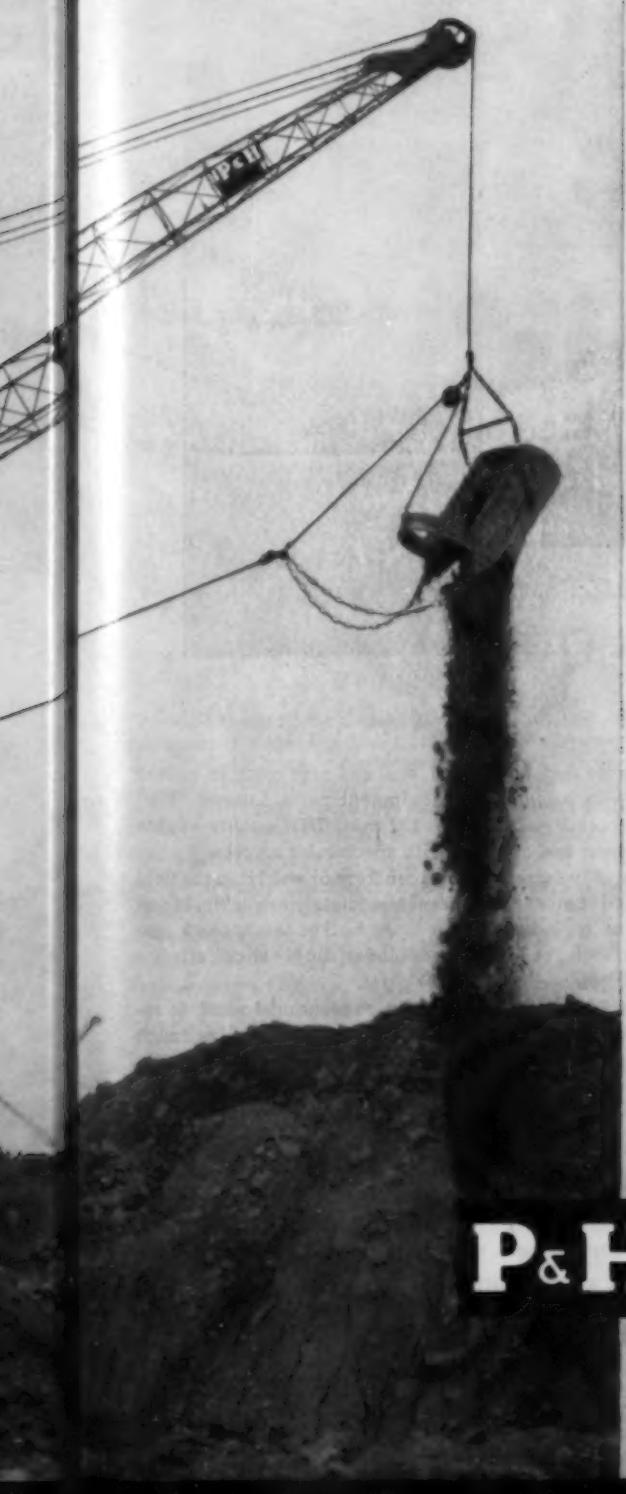
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Company _____	City _____
Address _____	_____
City _____	_____

AT SULLIVAN TRAIL C

Illustrated is one of two P&H Model 1855 Electric Long Range Draglines—and one of the seven P&H Excavators owned by Sullivan Trail Coal Co., West Pittston, Pa. It is shown stripping anthracite coal near Hazelton, Pa. The P&H 1855 is rated up to 10 cubic yards as either a Long Range Dragline or Stripper Shovel.



IL COAL COMPANY...



*One P&H always
sells another because*

P&H "PROFIT-YDS."
reduce open-pit
stripping costs
all day...every day

Faster swings, higher line speeds, greater line pulls and *maximum* availability all add up to lower cost per yard stripped.

Continuous, high production stripping with P&H Electrics in open-pit mining the world over is the end product of these patented principles:

MAGNETORQUE®... this drive electro-magnetically transmits power from a single A.C. motor to all work motions—drag, hoist, swing and propel. Because of Magnetorque the P&H 1855 swings at speeds unmatched for draglines of such long booms and large buckets.

ELECTRONIC CONTROL... the most responsive electric excavator control, which provides the fastest work cycles known on electric shovels and draglines.

Also, with P&H you get single source responsibility—an exclusive advantage experienced only by users of P&H Electrics. P&H manufactures their own electrical equipment—*designed specifically for electric shovel service*—as well as mechanical equipment. These patented P&H design principles offer more net profit to users—up to 10% more production, as much as 60% less electrical maintenance expense and downtime reduced as much as one half from that usual to excavators of this size.



**P&H MINING
EXCAVATORS**

HARNISCHPEGER CORPORATION
Construction & Mining Division
Milwaukee 46, Wisconsin

P&H ELECTRIC SHOVEL LINE: 3½ through 10 cu. yd. capacities

WHERE THE GOING GETS ROUGH...

get tough

WITH LUKENS "T-1" STEEL!

TRADE-MARK



■ Wherever rock and gravel, coal and ores come in violent contact with machine and equipment parts, Lukens "T-1" steel—especially extra tough 321 min. BHN quality—fights back at wear and abrasion with spectacular success.

It is readily fabricated. You can form or weld it in the field or shop, from stock plate sizes immediately available. It can be used to replace or repair worn bucket teeth, truck and mine car bodies or liners, dozer blades, dipper sticks, crusher teeth, chutes, and many other parts.

Far stronger for its gage than conventional steel, it requires less metal to do equivalent jobs. It remains tough even at sub-zero temperatures.

Contact your nearest warehouse listed below, or write Manager, Marketing Service, 140 Lukens Building, Lukens Steel Company, Coatesville, Pennsylvania. Ask for special bulletin, "Lukens 'T-1' for Toughness."

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Baltimore 2, Maryland, Wm. G. Wetherall, Inc., 317 President Street
Birmingham 2, Alabama, O'Neal Steel, Inc., P. O. Box 2623
Cleveland 6, Ohio, Mills-Wolf Steel Co., 10006 Carnegie Avenue
Los Angeles 33, California, The R. J. M. Company, 238 Mission Rd.
Montreal, Quebec, Can., Drummond, McCall & Co., Ltd., 930 Wellington St.



HELPING INDUSTRY CHOOSE STEELS THAT FIT THE JOB



This Barber-Greene underground mine conveyor is operating in the heart of West Virginia's bituminous field. Send for 192-page catalog describing the full Barber-Greene standardized conveyor line.

Lengthen easily — a cost-cutting advantage of Barber-Greene conveyors

Now 2000 feet long from face to portal, this Barber-Greene conveyor has already been extended several times. And it will be lengthened many more times before the deposit is worked out. The easy lengthening of Barber-Greene underground mine conveyors is just one of the many advantages of Barber-Greene standardization.

These advantages are:

Faster delivery. Packaged units come from dealer stock or are immediately available from the factory.

Low-cost erection. Conveyors get into operation sooner, with big savings in engineering costs.

Unmatched flexibility. Interchangeable parts simplify lengthening or shortening of conveyors to meet changing needs.

Parts availability. Repair parts can be shipped from stock—usually from the local distributor's stock.



Literature on request.

SB-2-PEU

Barber-Greene

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CONVEYORS... LOADERS... DITCHERS... ASPHALT PAVING EQUIPMENT

ENSIGN-BICKFORD
LOW-TEMP
PRIMACORD
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COAL AGE

FEBRUARY, 1959

IVAN A. GIVEN, EDITOR

Gains for Progress

In Retrospect "Basically, 1958 poses coal with the problem of adjusting to conditions that may exist without sacrificing any of the gains of recent years. The big need is for a firm stand against price concessions that are not warranted by improvements in costs. After that, coal can benefit from continued pressure to cut cost, heighten quality and promote safety through modern methods and equipment, plus expanded research, improved merchandising and better service to the customer. Adherence to this program will insure that when 1958 is history coal can look back and mark it up not as a setback year but a time of continued progress toward a better future for the industry."

Looking Ahead The preceding is quoted from the February, 1958, issue of *Coal Age*, and the record shows that coal did an outstanding job in all these directions in 1958 and as a result profited from extremity through conserving its assets and building on gains already achieved for a better future. Since bituminous, in particular, goes as industry goes, what is the shape of that future? The upturn from the latest depression started in 1958 and is expected, among other things, to result in an increase in the steel rate to 80% of capacity in the first six months of 1959, an increase of 45% over the level in the same period in 1958. Thus steel is expected to set the pace in continued recovery not to a boom but to a good level of prosperity.

Up for Coal As business continues to improve, coal will follow. The majority of the forecasts now place the production at 450 to 455 million tons in 1959, compared to approximately 400 million in 1958. The depression here and abroad also affected anthracite beyond the normal attrition of competition, with the result that 1958 tonnage dropped to around 21.8 million. It would have been lower except for a colder-than-normal December. With a continued break from the weather and with help from exports and industry, anthracite could enjoy a good 1959 and possibly—for the first time in years—could equal the output of the previous year.

Solid Progress Coal met the depression stresses and strains better in 1958 than in any other previous period in history, and thus definitely set the stage for more business through quality, more-competitive prices and better service. Thus, while competition is and will remain strong, coal entered 1959 in a better—much-better—position to convert forecasts of major increases in tonnage in the future into realities.

Recovery Spurs Coal Gains in '59

A revitalized economy paves the way for resurgence of bituminous. In the cards this year: 450 to 460 million tons. Hard coal's future focuses on commercial tonnage.

THE YEAR 1958 was one of extremity for coal. Out of this extremity, however, come signs of opportunity for immediate and long-range tonnage growth.

For anthracite, extremity meant that production was down to 21.6 million tons—3.5 million tons less than 1957 and the lowest annual commer-

cial output recorded since 1875. Responsible for most of the downturn was a loss of over 2 million tons in export sales.

For bituminous, extremity meant that production was down to about 400 million tons—a drop of 93 million tons from 1957 and a low point exceeded only in postwar years by the

392 million tons mined in 1954.

Immediate and long-range opportunities for anthracite focus primarily on the commercial market, where sales held fairly firm in 1958. The payoff here will come in the years ahead as the industry gears up its current campaign to reduce mining costs, adapt preparation schedules to meet growing small-size demand, and improve utilization through research.

Most of the poor showing in 1958 production of bituminous was due to sharply-reduced steel and export demand. The two markets together accounted for tonnage losses of 54 million tons. Demand in the industrial market fell off but the severity of the drop was braked by sustained, high-level cement-mill use. Losses in retail and railroad sales were relatively minor. Also in the picture: Customers drew down some 14 million tons of stockpile coal carried over from 1957.

The immediate opportunity for bituminous can be seen in terms of a national economy that achieved solid recovery in the last quarter of 1958. A revitalized economy brought with it a substantial pickup in bituminous demand. Several industry forecasts indicated that this pickup should mean a rebound from 400 million tons in 1958 to from 450 to 460 million tons in 1959.

Production in 1959 will benefit from expected consumption increases of 21 million tons by steel companies and 12 million tons by electric utilities. It will also benefit from modest gains in industrial and retail markets, and from need to build depleted stockpiles. Because of year-end carryover of high stockpiles by major European importing countries, overseas shipments will dip again but less severely with purchasing by mid-year probably moving back up to the 35- to 40-million ton annual range.

Thus, consumption by major markets and production in 1959 (allowing for stockpile buildup) might line up as follows:



COKE PUSH VOLUME was a major factor bringing hard times for coal in '58; it will be the key to better times in '59.

	Millions of Tons		
	1959	1958	1957
Electric utilities.....	164	152	157
Steel and chemicals.....	107	86	115
Industrial (inc. cementnt).....	94	88	98
Retail.....	36	33	36
Railroads.....	2	4	8
TOTAL U. S. CON-			
SUMPTION.....	403	363	414
Canada.....	11	13	18
Overseas.....	34	38	58
TOTAL CONSUMP-			
TION inc. EXPORT	448	414	490
PRODUCTION.....	453	400	493

Long-range, most industry analysts agree that bituminous tonnage could grow to 600 million tons by 1962 and 550 million tons by 1970. In 1958, however, speculation increased on whether bituminous was measuring up to its future. Measuring up involved solving such major problems, for example, as the following:

1. How to take full advantage of productivity gains and still absorb the 1958 wage boost and others likely to follow in later years.

2. How to combat oil, gas and potential nuclear competition more effectively.

3. How to achieve greater industry-wide action and cohesiveness in selling the bituminous product and story to the many publics vital to future growth.

These and other related problems are sure to come under closer industry scrutiny in 1959 and coming years. Some of the reasons why can be seen in reviewing the following highlights of the competitive picture, market trends and industry problems.

Bituminous Markets

COMPETITION: Running Strong

Both gas and oil showed remarkable resistance to the general decline in 1958 business activity. At year-end, too, there were strong indications that both would enjoy more prosperous years in 1959.

In December, the American Gas Association estimated that total sales of natural gas would run about 4.9% higher in calendar-year 1958 than in 1957. The estimate was based on sales data given on next page for 12 mo periods ending Sept. 30:

Anthracite Roundup—Tonnage Hits New Low in '58—Hopes Are Firm for Rebound

USBM's preliminary estimate indicates that 1958 production of anthracite (excluding colliery fuel) hit 21.6 million tons, 3.5 million tons less than in 1957.

Most of the tonnage loss was due to export volume which fell from 4.3 to an estimated 2.2 million tons. Orders from West European countries were down about 1.5 million tons; those from Canada, about 300,000 tons.

Comparing 12 mo periods ending Aug. 31, sales to electric utilities declined from 3.3 million tons in 1956-57 to 2.6 million tons in 1957-58. Reduced purchasing was attributed in part to the recession; it was also due to the fact that utilities drew more heavily than usual on their stockpiles.

Domestic use of hard coal was also off, mainly because of inroads made by competitive fuels. Latest available figures show that retail purchases totaled 9.5 million tons in the 12 mo period ending July 31, 1958—a drop of 17.8% from the 11.6 million tons recorded in the previous 12-mo period. The 1958-59 heating season, however, brought colder weather, and prospects of a substantial recovery in retail trade.

Last year's anthracite tonnage was the lowest since 1875. But the industry looked ahead with firm hopes for better times. Although recovery in export is doubtful and further retail losses are in the cards unless weather is unusually severe, possible gains in other markets may hold 1959 output to about the 1958 level.

Hopes for the future are based on recovery of the national economy; they are also based on growing demand in the commercial market (schools, apartment houses, etc.), the promise of new industrial uses, and opportunities to hold price advantages over competitive fuels through increased mining efficiency.

In a statement specially prepared for *Coal Age*, the Anthracite Information Bureau summarized progress in the commercial market as follows:

"Sales of commercial equipment for 1958 showed a net gain of 10% over sales in 1957. Equipment manu-

facturers see a continued rise during 1959, with at least another 10% rise expected. Manufacturers state that two-thirds of all automatic equipment sold in 1958 went into new construction. School sales are expected to increase during 1959, as a result of intensified sales efforts.

"In 1958, the commercial [or steam] sizes continued to constitute an increasing percentage of tonnage shipped to market. The year's figures will probably show that 59% of all anthracite reaching the market is steam sizes. This compares with just over 50% for 1957. The shrinkage in 1958 of the seam sizes—Buckwheat 1, 2, 3—will be about 17% as compared with shrinkage in domestic totals of 20%. From Sept. 15 to Dec. 13, producers' inventory of domestic sizes above ground, declined steadily each week when compared to the corresponding week of 1957, reaching a net decline of 100,000 tons on Dec. 13."

Another encouraging note came from Frank W. Ernest Jr., president, Anthracite Institute. At the annual meeting of the New Jersey Fuel Merchants Association late in 1958, he said:

"There is more than a hope—there is evidence that the downward trend has leveled off, and we will again have an anthracite business of substantial consequence for both retailers and producers for many years to come." As evidence, Mr. Ernest pointed to greater emphasis on research in utilization and mining, more cooperation from all parts of the industry, and increased mining efficiency. In particular, he noted: "Definite progress has been made in reducing costs through the elimination of high-cost operations, centralization of production, and reductions in pumping costs by the federal-state drainage programs."

Worth watching in 1959, one of the major anthracite producers, Philadelphia & Reading Corp., will probably move nearer to commercial development of new industrial uses. Further capital outlays for a long-standing project to gasify anthracite are believed imminent as a result of new funds created through the 1958 sale of one of its subsidiaries, the Shuron Optical Co.

	12 Mo to 9/30/58	12 Mo to 9/30/57	% of Change
	Millions of Thermas		
Residential	26,280.8	23,262.3	+12.9
Comm'l.	7,230.6	6,410.6	+12.8
Ind'l.	39,790.2	39,714.2	+ 0.2
Other	3,356.2	3,703.5	- 9.6
TOTAL	76,657.8	73,090.6	+ 4.9

Developments in 1958 which favor a prosperous year for natural gas in 1959 are the following:

1. The Harris Bill died in the second session of the 85th Congress and with it—at least temporarily—coal's attempt (through a compromise amendment) to prevent dump sales of natural gas to industry.

2. The FPC virtually opened the door to imports of Canadian natural gas (*Coal Age*, Dec. 1958, p 26).

3. The Supreme Court's ruling in the Memphis case, allowing transmission companies to increase rates without prior FPC approval, cleared roadblocks to expansion of pipeline networks. (However, it should be noted here, the net competitive advantage should be coal's as higher gas rates will widen price advantages in coal's favor.)

Compared to 1957, domestic demand for all oils during the first 9 mo of last year moved up 1.3% from 2,377 million to 2,408 million bbl. Of more special interest to coal, however, were continuing-high and rising imports of residual oil, as shown in the following data supplied in December by the American Petroleum Institute:

	1958	1957	% of Change
	Thousands of Bbl		
Jan.-Sept....	126,317	126,489	- 0.1
Oct.....	15,221*	13,318	+14.3
Nov.....	16,250*	14,103	+15.2
Dec.....	21,750*	19,340	+12.5
TOTAL....	179,538*	173,250	+ 3.6

*Estimated

In spite of climbing imports of residual oil and aggressive effort by coal to combat the trend, there were no concrete signs at year-end that an immediate solution to the problem was in the offing either through voluntary or mandatory federal curbs.

Nuclear power made little or no gains in competitive stature during 1958. But the Democratic landslide in Congress in November set the stage for greater gains this year by strengthening prospects for passage of a modified "crash" development program.

ELECTRIC UTILITY:

Long-Range Growth Firm

Consumption in 1958 was disappointing in terms of expected growth. A substantial pickup in 1959 utility tonnage is anticipated, however, and prospects for major, long-range market growth remain undimmed.

Utility coal-burn this year should reach 164 million tons, according to *Keystone Coal Buyers Manual*, a *Coal Age* affiliate. The forecast is based on results of a survey covering 92 utilities which consumed about 47% of the estimated total 1958 coal-burn (152 million tons). The publication adds:

"For 1958, of course our [December, 1957] predictions [172 million tons] were way off, for neither we nor the 100 utilities that gave us their estimates foresaw the full import of the recession." Also difficult to anticipate, KCBM points out, was tougher competition from oil, gas and hydro. Heavy rainfall, for example, gave hydro an unpredictable advantage which, along with new plants, put hydro production about 10% ahead of 1957 and displaced about 6 million tons of coal.

Long-range, *Coal Age* (February, 1958, p 84) predicted a minimum utility coal use of 467 million tons by 1975. The forecast took into account current and future trends in competitive fuel use and is based on the assumption that coal will retain at worst a 70% share of the total fossil-fuel market.

Most "straight-electric" companies are now pushing electric heat as the key to long-range growth in residential and commercial sales. Their success will be a major factor in boosting utility coal burn to the predicted '75 minimum of 467 million tons (*Coal Age*, January, 1959, p 70).

Trend-marker in 1958 was the November dedication of a new industrial center in southwest Virginia, created through the joint planning efforts of an electric utility, a coal company, and a coal-carrying railroad. Simultaneously dedicated at Carbo were the Clinchfield Coal Co.'s Moss No. 3 mine which is expected to produce 1.3 million tons annually; Appalachian Electric Power Co.'s 450,000 kw Clinch River Plant (a few miles distant); and 30 mi of track built by the Norfolk & Western Ry. to serve the two plants. When completed, the joint

project will cost an estimated \$150 million.

STEEL AND CHEMICALS:

Welcome Comeback in '59

In 1959, steel companies will use about 107 million tons of coal to make an estimated 110 million tons of steel and to supply coke-oven by-product needs of the chemical and gas industries. If the forecast pans out, it will be a welcome comeback from last year's coal use which nose-dived from 115 to 86 million tons.

Total steel production in 1959 is based on quarterly estimates of steel ingot output which will move up slowly from 25,800,000 tons in first-quarter 1959 to 29,500,000 tons in the fourth quarter. Estimated output in fourth-quarter 1958 was 26,300,000 tons.

Expected to bolster steel's recovery this year are pickups in orders from auto, oil, railroad and construction industries. Potential roadblock to recovery is a possible July strike. If such occurs, however, effects on the year's total steel output should be lessened to the extent that steel users carry through with reported plans to stockpile in advance.

Commenting on coal's position in the steel market, *Keystone*, states:

"Metallurgical coal use will increase, with most of the increased need to come from commercial operators. Expanding taconite and sintering programs will result in an increase for steam coal in the steel and rolling mill category."

Direct-reduction processes are still much in the news. Many steel executives admit the new techniques figure importantly into long-range plans. But, as far as known, none yet expects that they will replace conventional methods during the foreseeable future. A more pressing immediate need, most would concede, is to realize greater economies from existing coke-oven and blast-furnace facilities.

INDUSTRIAL:

Relatively Stable

Suffering mainly from the general decline in business activity, consumption by "other industrials" (including cement) dipped about 10% from 98 to an estimated 88 million tons. Forecast for 1959: 94 million tons.

How the Top 15 Coal-Producing Groups Ranked in 1958

Compiled by KEYSTONE COAL BUYERS MANUAL, A Coal Age Affiliate

Group or Company	1958 Tonnage	% Change 1957 to 1958	1957 Tonnage	% Change 1956 to 1957	1958	Standing	1957	1956	1955
Consolidation Group	27,988,182	-19.9	34,939,943	+4.2	1	1	1	1	1
Peabody Group	22,228,696 (1)	-4.1	23,172,296	+6.8	2	2	3	3	3
U. S. Steel (c)	16,772,468	-27.4	23,067,215	+0.7	3	3	2	2	2
Island Creek	10,457,461	-24.5	13,852,711	-6.3	4	4	4	4	4
Pittston Group	10,115,380 (2)	-20.1	12,654,000	+21.8	5	6	6	7	7
Bethlehem Steel (c)	10,085,970	-24.1	13,275,976	+11.5	6	5	7	5	5
Eastern Gas & Fuel	9,475,265	-20.5	11,922,466	+7.5	7	7	5	6	6
Truax-Traer	7,214,301	-8.8	7,906,828	-1.7	8	8	9	8	8
Freeman	6,868,737	-0.5	6,905,475	+0.1	9	9	11	10	10
West Kentucky Group	5,723,692	-12.2	6,521,540	-15.4	10	10	10	19	19
Ayrshire	5,721,079	-1.0	5,778,909	+3.4	11	12	13	16	16
North American Group	5,325,554	-13.2	6,140,710	-0.5	12	11	12	13	13
Massey Group	5,118,384	-3.8	5,318,012	+27.2	13	13	21	20	20
Old Ben	4,411,800	-7.5	4,769,113	-0.7	14	15	17	18	18
Jones & Laughlin	4,192,718	+4.1	4,027,389	-15.2	15	20	18	14	14
Totals	151,699,687	-15.9	180,252,583						

(c) Captive.

(1) Includes Windsor Coal Co., acquired 4/58 and Alva Coal Corp., acquired 11/58.

(2) Includes Elk River Coal & Lumber Co., acquired 12/58.

The industry's top 15 producing organizations mined 151,699,687 tons in 1958, 37.9% of the total bituminous and lignite production in the U. S. A. Only one of these showed an increase over 1957, but eight showed losses less than the industry average loss of 19.1%.

For the year 1958, only two of the top 15 companies acquired other properties by purchase or merger. Peabody purchased the Alva mine of Black Star and the Windsor Coal Co., while Pittston acquired Elk River Coal & Lumber Co.

The percentage of the total produced by the top 15 has increased every year in the 1950's, ranging from 21.7% in 1950 to this new high of 37.9% in 1958. Every indication points to a continuation of this trend.

One newcomer, Jones & Laughlin Steel Corp., appears in the top 15 this year.

Cement-mill use of coal decreased less than 1% from 8.8 to an estimated 8.1 million tons. Strength here reflected sustained high-level construction activity. Continued growth in cement-mill purchasing is anticipated as the Federal Government's 13-yr, \$30 billion highway building program gathers momentum. At NCA's convention last June, for example, C. F. Clausen, Portland Cement Association, predicted:

"We expect that, even with a hoped-for better fuel economy in cement kilns, the industry will consume nearly 14 million tons of coal per year by 1966 (an increase of almost 60% from 1957) . . ."

Two new BCR-developed coal-burning units now being sold gave increasing promise of undergirding the future of the industrial market:

1. The International-BCR Coal Pak—a completely automatic coal-fired packaged steam or hot-water generator for commercial and small industrial plant use (*Coal Age*, December, 1958, p 74).

2. The Fire-Jet Burner—an automatic coal-fired stoker for commercial use.

A third equipment unit is now being manufactured for commercial and industrial use, the BCR Easy-Flo Bin

—a bin discharge device which unloads coal or other bulk solids without arching, funneling or rat-holing.

BCI continues to make a vital contribution. Reported in November at its general staff meeting in Washington was this achievement:

"The personalized consumer engineering service conducted by BCI has gained or retained over 7 million tons of coal in the past year. Even more important is the background result—the widening of coal acceptance among new and present fuel consumers and the education in coal facts of many architects and engineers who formerly dismissed coal from consideration in favor of fluid fuels."

Certain to benefit the cause of improving market analysis and sales promotion was the resumption last year of USBM releases giving detailed distribution data on the origin and destination of bituminous and lignite shipments. Annual and quarterly reports are now being issued as soon as they can be compiled from producers' reports.

RETAIL: Leveling Off

Retail deliveries should hit about 34 million tons in 1958, down only 2

million tons from 1957. The relatively minor tonnage drop corroborated belief that the market here is leveling off. Further gains by oil and gas among residential customers are a pretty safe assumption. Such gains, however, should at least be offset by coal's added strength in sales to schools and other commercial outlets served by retail yards. Betting that commercial sales will tip the scales somewhat in coal's favor, *Coal Age* predicts 36 million tons for 1959.

Long-range, coal's best hope for recapturing big losses in retail sales during the past 15 yr is through joining with utilities in all-out promotion of electric heat. *Coal Age*'s lead feature last month defined the significance of this development to coal and documented in detail the factors that now portend its accelerated growth.

RAILROAD: Nearing the Bottom

Last October, the Norfolk and Western Ry. was scheduled to begin replacing its fleet of 282 steam locomotives with diesels. Such developments took the railroad market one step nearer extinction. Remaining mainly is tonnage for powerhouse and station use. Chances are, therefore,

railroad consumption in 1958, about 4 million tons, will fall to 2 million tons, this year.

"Operating economies continue favorable to the coal-fired gas turbine," P. R. Broadley reported at BCR's annual convention in June. Full-scale development funds, however, were temporarily suspended Dec. 13, 1957, because of the business recession. The project was put on a standby basis, wherein key personnel are retained and the test unit remains "white-leaded" until further funds are available.

EXPORT: Down but Still a Bulwark

Total exports fell from 76 to an estimated 51 million tons, with the breakdown occurring as follows:

	1957	1958
Overseas.....	58	38
Canada.....	18	13

In 1959, an export total of 45 million tons is anticipated, with overseas shipments dropping from 38 to 34 million tons and Canadian deliveries decreasing from 13 to 11 million tons.

Behind the 20-million ton drop in overseas coal last year was a combination of factors including excessive European stockpiles caused by overbuying in 1957, a dip in the rate of European industrial growth, increasing competition from oil and gas, and price cutting by Poland and the U.S.S.R.

To reevaluate the permanency of the overseas market, *Coal Age* checked with its correspondents in European countries which either compete with, or buy most of, the U.S. coal exports. Sifting through their reports brought these main conclusions (November, 1958, p 74):

1. Overseas trade will continue as a bulwark to the industry's total merchandising structure.

2. Neither local production of importing countries nor exportable surpluses of traditional European suppliers are adequate in quantity or quality to meet long-range needs for West Europe's industrial growth.

3. Between now and 1965, annual overseas shipments should level off at the 35- to 40-million ton range, or more than double the pre-1955 volume.

In any market so historically volatile as exports, however, the possibility of temporary dips below or spurts be-

yond range limits cannot be ruled out. One notable effort toward stability: Early in 1958, low-volatile and high-volatile coal producers formed two separate corporations to promote and stabilize overseas sales.

Problems and Progress

MANAGEMENT: Assessing Growth Needs

Faced with the sharpest decline in production since 1954, coal management last year took a real hard look at its record. The tonnage drop could be explained away by the recession and cutbacks in steel and export markets. And the industry again could point with pride to new gains in mining and preparation efficiency, and to widening acceptance of aggressive safety, cost control, preventive maintenance and training programs.

Some farsighted leaders, however, not completely satisfied with the record, wondered if the industry was measuring up to its potentials for the future. Will we reach 600 million tons by 1962 . . . 850 million tons by 1970? If progress is not satisfactory, what are the missing links?

One possible clue came in a special, 12-page, *Coal Age* feature, "Selling Your Company and Your Industry" (March, 1958). The article called for more conscious, integrated effort to win the confidence and enthusiasm of all groups — personnel, customers, stockholders, legislators, etc. — whose attitudes can directly affect the welfare of a company or industry and the conduct of its business.

At the American Mining Congress in May, John L. Lewis struck a similar note:

"I think the industry needs a forum, which to some degree exists in other industries, where all segments of our industry could come to discuss, to debate and to conclude on matters of major public policy and the acute problems that confront the industry." This agency would be the voice of the total industry, and as such, Mr. Lewis added, it "would be much stronger and more effective on the things upon which we could agree than the voices raised heretofore."

On the strictly company level, more clues came in an October *Coal Age* feature, "Modern Management Meth-

ods Pace North American Growth." Keynote of the article:

"North American's rise to prominence as the ninth largest commercial producer of bituminous coal reflects no magic or miracles. Rather the experience shows how careful, long-range management planning can integrate all phases of production and marketing to serve total company growth. This means:

"Acquiring properties and introducing equipment which have the greatest cost-reducing and profits-producing potentials.

"Coordinating sales development with mine and market locations.

"Building a strong reserves position.

"Expanding working capital.

"Improving personnel performance.

"Developing new and improved products.

"Implementing the broad concept of public relations."

The upshot of it all: Experience is available in or outside the industry to guide coal management in winning its future; but, to gain this objective, this experience must be harnessed and put to work on broader scales than presently conceived.

LABOR: New Contract a Challenge

Top highlight of the labor year came in December with the signing of a new labor contract between UMWA and bituminous operators. Contract provisions included the following:

1. A \$2 hike in the daily wage, effective in two installments, \$1.20 Jan. 1 and \$0.80 April 1.

2. An increase in vacation pay from \$180 to \$200, effective in June.

3. A "protective wage clause" by which commercial operators agreed they would neither buy or process nonunion coal, nor lease coal lands or preparation facilities for nonunion production. Under the same clause, UMWA agreed not to favor certain operators with "sweetheart" deals.

Steel companies and other "captive" operators were excluded from the protective clause because they produce entirely for their own consumption.

The new labor pact will boost the minimum daily wage rate to \$24.25. Industry analysts expect that a series of price increases will follow. But these should be relatively small in

view of the proven ability of producers to absorb added wage costs through astute management and greater efficiency in production. Under-scoring this ability at an October meeting of the West Virginia Coal Mining Institute and the Central Appalachian Section, AIME, Ivan Given, chief editor, *Coal Age*, commented:

"In 1958, I estimate that the average bituminous value at the mine will be around \$5. In 1948, the value was \$4.99. In that period the base wage rate rose from \$13 to \$22 per day, and payments into the welfare fund from 10c to 40c per ton."

TRANSPORT: Seeking Lower Costs

Though not yet a well-defined trend, prospects continue to improve for stemming or reversing the seemingly endless upward movement in coal's rail transport bill.

Beefing up the prospects last year, the Nation's rail carriers accelerated and widened efforts to ease heavy financial burdens through mergers, cuts in unprofitable passenger traffic, and campaigns to reduce operating expenses. The carriers also gained passage of the federal railroad aid bill granting \$500 million in government-guaranteed loans and revising ICC authority over rates and service (*Coal Age*, July, 1958, p 26).

With increasing concern, the railroads have watched coal tonnage diverted to river barges. They have also seen the development of new methods of transport such as pipelines and long-distance transmission of coal-energy by wire. Thus, by moving to ease financial burdens, rail management might also be moving toward a firm basis which would eventually permit the downward revision of rates and other measures needed to hold or recover coal business.

Some midwestern and southern lines have already sought or obtained lower rates on certain coal shipments (*Coal Age*, June, 1958, p 58; October, 1957, p 162; November, 1957, p 138). Worth noting, too, rate reductions for coal were reported a possible outgrowth of an impending rate war between rail and barge lines in the Midwest (*Coal Age*, November, 1958, p 52).

A 1958 report from NCA's Transportation Dept. pointed up the big jump in coal river traffic. In the 12-yr



UNDERWAY IN 1959 will be construction of new headquarters (above) for NCA and other industry groups at 17th & DeSales St., N. W., Washington, D. C.

period, 1946-57, bituminous tonnage moving on principal rivers increased from 35 to 78 million tons. Traffic on the Ohio River alone rose from 5 to 22 million tons.

Last year considerable progress was made in advancing the use of pipelines to transport coal. Notable were the following:

1. Hanna Coal Co.'s 108-mi pipeline from Georgetown to Eastlake, O., was reported in full operation (*Coal Age*, September, 1958, p 44).

2. In December, the Youngstown Coal Pipeline Co. announced plans to build a 30-mi coal-carrying pipeline from East Liverpool on the Ohio River to Youngstown steel mills. Estimated to cost \$10 million, the pipeline will be able to carry 33 million tons of coal a year (*Coal Age*, January, 1959, p 54).

Other similar projects for transporting coal in water are reported under study. At the same time, several *Coal Age* features drew the industry's attention to the possibilities and advantages of air- or dry-pipeline of coal (1958 issues—February, p 12; May, p 118; October, p 52).

LEGISLATION: Major Issues Unsolved

When the second session of the 85th Congress adjourned in August, coal could point to several legislative gains. Among these: Pre-merger notification

bills were defeated; inclusion of the Byrd Amendment in the Trade Agreements Extension Act gave the industry new statutory weapons to fight imports of residual oil; the 4c tax on transportation of coal was repealed; and railroads were denied authority to engage in commercial coal production from public lands.

Still hanging fire were such major issues as expanded public and atomic power programs, "dumping" of natural gas, imports of residual oil, an inadequate percentage depletion allowance, and proposals to set up a research and development commission for coal.

At NCA's annual convention in June, Executive Vice President Tom Pickett called the turn on coal's legislative needs:

"NCA will continue to do its best unremittingly in attacking legislative problems. But I urge the industry to broaden its influence by enlarging the scope of its activities. Results will be more lasting and effective if NCA's efforts are supplemented by those engaged in the business."

This plea for more active support from coal men and their companies could hardly have been better timed. Less than 6 mo later, an FPC decision virtually opened the door to imports of Canadian natural gas and a Democratic landslide in Congress left no doubts of a tougher legislative battle ahead (*Coal Age*, December, 1958, p 26).



REMOTE CONTROL SYSTEM for boring-type continuous mining machine enables operator to follow machine at distances up to 50 ft. Greater safety for the operator is the big advantage, especially in pillaring and in narrow places.

Approaches to automation highlight developments in

Mining, Stripping, Preparation in 1958 Deep Mining

THE DOMINANT THEME in deep mining in 1958 was the continuing emphasis on remote control of operations as a first step toward the ultimate goal of full automation. The drive toward this goal is energized by the train of events which led to a labor cost of \$375 per week to man a job on a three-shift basis. Furthermore, automatic control of processes eliminates some of the possibilities for human error, and, of even greater importance, reduces the exposure of great numbers of men to the natural hazards of underground coal mining.

A number of developments in face operations, in transportation and in power distribution spotlight this trend. Here they are:

Face Operations

A remote-control system that per-

mits the operator to follow his continuous mining machine at a distance of 50 ft is undergoing tests in a salt mine where coal-mining equipment is employed. In this forerunner of a system that may soon be applicable in coal, the motions of the machine are controlled from a lightweight switch panel carried by the operator. The switches on the panel are cable-connected to relays on the machine which operate pilot valves in the hydraulic circuits of the miner. This system is particularly effective with boring-type machines. New techniques are being perfected for automatic cycling of ripper-type machines.

Continuous mining, which in itself automates the conventional face operations, is a distinct possibility for development work in pitching veins since the unveiling of a "Borecut" mining machine (*Coal Age*, January, 1958, p 122). The machine is designed to drive entries of any desired shape along the strike, to cut to

heights of 14 ft and to elevate timbers.

Conventional equipment has been used to extend the values of continuous mining. According to an article in the February, 1958, issue of *Coal Age* (p 124), a universal cutting machine provides an 11-ft-deep slabbing cut along the midpoint of each rib in rooms driven by boring-type mining machine. Loading machines retrieve the coal along each side of the room after the side cuts have been drilled and blasted.

Roof Control

The best roof support for a number of years has been that which is based upon inviolate standard patterns. Such standard patterns may someday provide the basis for automatic, self-cycling roof-bolting machines operated by electronic programming. In the meantime, "satellite" bolting machines are already in service to permit roof-support standards to be maintained concurrently with continuous mining. The bolting units are mounted at the sides of the miner to install bolts while the miner cuts coal—and even while the mining machine moves ahead. (*Coal Age*, September, 1958, p 92).

Effectiveness of roof bolting was



BLOW CHARGING of horizontal blast holes offers advantages of faster, denser loading of ammonium nitrate-oil mixture, plus lower-cost tamping of charges.



BULK LOADER for vertical holes delivers ammonium nitrate-oil mixture at rates up to 300 lb in 20 sec. Loader is removable from truck.

increased through the application of visual tension indicators which show the initial tension in the bolts upon installation and any later loosening or loading. A description of their use appears in *Coal Age*, September, 1958, beginning on p 80.

In parallel studies, infusion of the roof with adhesives over the solid coal in advance of mining has been tried in at least two instances. Full results are not yet in the record, but the continuing interest of mine operators in this possibility for improved roof control indicates that the idea has merit and promise.

Transportation

Placing and removing skids under the wheels of mine cars on grades is just about the last operation one would expect to see automated. However, it is being done today

successfully. In this instance, the skids are magnetic track shoes carried on a special "brake-car" which is coupled to the trip. The magnetic shoes are energized by a storage battery carried on the brakecar. Centrifugal switches, set to operate at a predetermined speed of the car, open and close the battery-magnetic shoe circuit as required to introduce or remove skid-type friction in the haulage trip. Furthermore, the locomotive operator is the only man required to handle a trip. (See p 113 of this issue for a description of an actual installation.)

At a midwestern mine a portable conveyor has been developed and successfully used which, in effect, automates a portion of shuttle-car haul distance. The results are a section using two cars instead of three, reduced shuttle-car maintenance, lower cable costs, smaller crew and

so on. The equipment consists of a belt conveyor mounted on a rubber-tired undercarriage. The 200-ft-long unit can be hauled ahead in an advancing entry to keep shuttle-car distance from face to tail pulley to a minimum. Using this device, the company now sets up a new loading point at each crosscut, using a portable cross conveyor to carry coal from the main portable unit through the crosscut to mine cars in the next entry. Automatic car-loading systems of a number of types are being studied to further increase the economy of the operation.

Other developments in transportation equipment include the introduction of low model (30-in) single-motor shuttle car for AC or DC operation (*Coal Age*, March, 1958, p 152), and first operating reports of a cable-belt installation in North America. This cable belt, operating as a slope hoist in Nova Scotia, measures 3,800 ft from head pulley to tail pulley. Slope inclination is 11 deg. The belt has economically transported over 1½ million tons in little more than 2½ yr of operation (see *Coal Age*, September, 1958, p 106).

Ventilation, Dust Control

The big news in ventilation and dust control during the past year was the growing interest in the development of techniques for auxiliary face ventilation, including both separate fans and units for mounting directly on continuous-mining machines. One such plan involves the use of an inertial dust collector which moves a stream of air and precipitates dust from that stream in one operation.

Experiments have been carried on in the use of foam to trap dust at the face. It is hoped means may be developed to permit the foam to be introduced at the cutting bits to prevent dust from becoming airborne. There are problems, but a start has been made toward their solution.

Word from overseas tells of German studies on the use of a calcium chloride "paste" which is sprayed on roof, ribs and floor as a protective measure against the propagation of dust explosions and as an entrapment media for airborne dust. The calcium chloride keeps the paste in a wet condition.

Also in the works are several schemes, one on actual trial, for the continuous monitoring of methane at

the face. The idea is for automatic detection of the gas with appropriate warnings as the concentration builds up and automatic interruption of face power when a certain predetermined concentration of methane-in-air is reached.

Power Control

The labor cost for round-the-clock attendance at a remote substation or fan runs up to about \$500 a week. The possibility of making savings of this magnitude has led to the development of a number of schemes for remote monitoring and control of these outlying facilities. Those of major interest include a "circuit scanning" system and a wireless two-way radio system.

The circuit scanning system employs the conventional two wires and common types of relays and other components.

The wireless system, which may be made a part of an installed two-way radio system, employs regularly broadcast audio tones between control station and remote station to check functions and relay information.

Stripping

MORE POWERFUL MACHINES—to drill faster and deeper, to mechanically load blastholes with bulk explosives, to remove thicker overburden faster, and to haul more coal per trip—this was the stripping picture for 1958. It was a year when more giant 60- and 70-yd shovels went into action to gobble up overburden at ever increasing rates in bituminous pits. And in anthracite, companies dug deeper with larger draglines. It was a year when coal operators began to think seriously in terms of 100- and 125-ton coal haulers to match capacity of the giant stripping machines. It also was a year when gains were recorded in drilling and blasting techniques. And it was a year when ripping became more popular for breaking coal and overburden and highwall augers continued to be used to recover coal beyond the stripping limit.

Drilling and Blasting Highlights

A "down-the-hole" percussion drill equipped with carbide-tipped bits

New Bituminous Preparation Facilities

Coal Company	Plant Location	Capacity, TPH	Preparation Equipment
Amherst Coal Co.	Lundale, W. Va. (12)	190	Kanawha ¹ Heyl & Patterson ² Deistar Concentrator ¹
Bedgett Mine Stripping Co.	Providence, Ky. (2)	500	Jeffrey ¹
Benjamin Coal Co.	LaJose, Pa.	140	Dorr-Oliver ¹ Ducon ¹ Fuel Process ^{1,2}
Bituminous Tri-Utility Coal Co.	Vaughan, W. Va.	120	Daniels ¹
Bolt Mining Co.	Bolt, W. Va.	120	Deistar Concentrator ¹ Fuel Process ^{1,2} Heyl & Patterson ² Industrial Engr. ¹ Fuel Process ¹
F. Y. Borden Co.	Cumberland, Md.	100	Jeffrey ¹
Buchanan County Coal Co.	Big Rock, Va.	...	Kanawha ¹ Elmco ¹ Western Machinery ¹
Cambridge Smokeless Coal Co.	Westover, Pa.	150	Kanawha ¹ Elmco ¹ Western Machinery ¹
Cambridge Smokeless Coal Co.	Page, W. Va. (2)	160	Jeffrey ¹ Kanawha ¹ Elmco ¹ Western Machinery ¹
Cannelton Coal & Coke Co.	Cannelton, W. Va.	25	Elmco ¹ Western Machinery ¹ Deistar Concentrator ¹
Cannelton Coal & Coke Co.	Cannelton, W. Va.	50	Daniels ¹ Elmco ¹ Western Machinery ¹ Deistar Concentrator ¹
Carbon Fuel Co.	Winifrede, W. Va.	12	Elmco ¹ Western Machinery ¹
Carrs Fork Coal Co.	Altock, Ky.	200	Fuel Process ¹ Robert Holmes ¹ Industrial Engr. ¹
Cedar Creek Coal Co.	Burnsville, W. Va.	60	Elmco ¹ Western Machinery ¹
Central Appalachian Coal Co.	Montgomery, W. Va.	4	Elmco ¹ Western Machinery ¹ Heyl & Patterson ¹ Irvin-McKelvey ¹
Central Ohio Coal Co.	Zanesville, Ohio	...	Fairmont ¹
Chapel Coal Co.	Kingwood, W. Va.	250	Cent. & Mech. Ind. ¹ Link-Belt ¹
Christopher Mining, Inc.	Buckhannon, W. Va. (2)	...	Deistar Concentrator ¹ Heyl & Patterson ¹ Fuel Process ¹
Clinchfield Coal Co.	Clinchfield, Va.	250	Daniels ¹ Kanawha ¹ Elmco ¹ Western Machinery ¹
Clinchfield Coal Co.	Dante, Va. (32)	768	Elmco ¹ Western Machinery ¹
Cornell Coke Co.	Sabraton, W. Va. (3)	72	Deistar Concentrator ¹ Heyl & Patterson ¹
Critical Fork Coal Co.	Norton, Va.	100	Daniels ¹ Kanawha ¹
Crozer Coal & Land Co.	Dott, W. Va.	50	Elmco ¹ Heyl & Patterson ¹ Fuel Process ¹
Crystal Block Coal & Coke Co.	Lynco, W. Va.	60	Daniels ¹ Elmco ¹ Kanawha ¹ Heyl & Patterson ¹
Dippel & Dippel Coal Co.	Edna, W. Va.	250	Fuel Process ¹
Feds Creek Coal Co.	Clairfield, Tenn.	150	Daniels ¹ Elmco ¹ Kanawha ¹
Freeman Coal Mining Co.	Biggs, Ky.	300	Nelson L. Davis ¹ Western Machinery ¹
Fry Coal Co.	Waltonville, Ill.	200	Daniels ¹ Elmco ¹ Kanawha ¹
Fry Coal Co.	Mercersburg, Pa.	60	Elmco ¹ Western Machinery ¹
Gay Mining Co.	Gilbert, W. Va.	350	Elmco ¹ Western Machinery ¹
Gay Mining Co.	Gilbert, W. Va. (12)	...	Deistar Concentrator ¹ Roller ¹
Glosser Coal Co.	Johnstown, Pa.	100	McNally Pittsburg ¹
Hanna Coal Co.	Georgetown, Ohio	40	Heyl & Patterson ¹
Harman Mining Corp.	Harman, Va. (8)	192	Deistar Concentrator ¹
Heller Coal & Coke Co.	Heller, Ky.	24	Deistar Concentrator ¹
Island Creek Coal Co.	Wyoming, W. Va.	65	Dorr-Oliver ¹ Elmco ¹ Western Machinery ¹
Independent Coal & Coke Co.	Bradshaw, W. Va.	11	Elmco ¹ Western Machinery ¹
Jewell Ridge Coal Co.	Castlegate, Utah	50	McNally Pittsburg ¹
Jewell Eagle Coal Co.	Jewell Valley, Va. (32)	160	Heyl & Patterson ¹
Jewison Coal Co.	Jewell Valley, Va. (6)	144	Deistar Concentrator ¹
Lake Superior Coal Co.	Wanda, W. Va.	...	Elmco ¹ Western Machinery ¹
Lake Lynn Fuel Co.	Salina, Pa.	300	Elmco ¹ Western Machinery ¹
Lester Smokeless Coal Co.	Salina, Pa. (5)	120	Deistar Concentrator ¹
Lyburn Mines, Inc.	Superior, W. Va.	...	Kanawha ¹ American Air Filter ¹
Mary Gail Coal Co.	Poland, Pa.	100	Fuel Process ¹
Mathies Coal Co.	Beckley, W. Va.	100	Roller ¹
Morris Bros. Coal Co.	Lyburn, W. Va.	150	McNally Pittsburg ¹
Mountaineer Coal Co.	Mary Gail, Ky.	60	Link-Belt ¹
Oiga Coal Co.	Courtney, Pa. (2)	...	Heyl & Patterson ¹
Old Ben Coal Corp.	Horton, Ky.	90	McNally Pittsburg ¹
Pacific Power & Light Co.	Fairview, W. Va.	...	Fairmont ¹ Bird ¹
Page Coal & Coke Co.	Coalwood, W. Va.	...	Dorr-Oliver ¹
Pain Poachontas Coal Co.	Sesser, Ill.	700	Robert & Schaefer ¹ McNally Pittsburg ¹
Peabody Coal Co.	Glenrock, Wyo.	500	McNally Pittsburg ¹
Pine Township Coal Co.	Stephenson, W. Va.	250	Kanawha ¹
Pittsburgh Coal Co.	Keystone, W. Va.	50	Roller ¹
Pittsburgh Coal Co.	Keystone, W. Va.	350	McNally Pittsburg ¹
Pittsburgh Coal Co.	Hollwood, Pa.	110	Robert Holmes ¹ Heyl & Patterson ¹
Pittsburgh Coal Co.	Hutchinson, Pa.	...	

Contracted for in 1958*

Coal Company	Plant Location	Capacity, TPH	Preparation Equipment
Pocahontas Fuel Co.	Pocahontas, Va. (7) Pocahontas, Va. Bessemer, Va.	168	Deister Concentrator ¹ Heyl & Patterson ² Fairmont ³ Cont. & Mech. Ind. ¹⁴ Fairmont ³ Denver Equipment ¹⁵ Western Machinery ¹⁶ Fairmont ³ Denver Equipment ¹⁵ Cont. & Mech. Ind. ¹⁴ Deister Concentrator ¹ Fairmont ³ Denver Equipment ¹⁵ Fairmont ³ Western Machinery ¹⁶ Deister Concentrator ¹ Bird ¹⁷
Pocahontas Red Ash Mining Co.	Covel, W. Va. (5)	15	
Red Parrot Coal Co.	McCormick, W. Va.	...	
Review Coal Co.	McCormick, W. Va.	...	
Rochester & Pittsburgh Coal Co.	McCormick, W. Va.	...	
Rochester & Pittsburgh Coal Co.	McCormick, W. Va. (6) Bishop, Va.	144	
Smelt-Solvay Div.	Itmann, W. Va. (6)	...	
Slab Fork Coal Co.	Jenkinjones, W. Va. (2) Jenkinjones, W. Va. Jenkinjones, W. Va.	48	Deister Concentrator ¹ Dorr-Oliver ¹⁸ Ducon ¹⁹ Jeffrey ²⁰ Kanawha ²¹ McNally Pittsburg ²² Heyl & Patterson ¹⁶ Daniels ²³ Heyl & Patterson ¹⁶ Jeffrey ²⁰ Western Machinery ¹⁶ Elmco ²⁴ Kanawha ²¹
Swords Creek Mining Co.	Iaeger, W. Va.	75	
Ten-X Coal Co.	Prater, W. Va.	100	
Terramanna Bros. Coal Co.	Hartford, Ky.	350	
Tri-K Mining Co.	Ernest, Pa.	...	
Truax-Trær Coal Co.	Glenville, W. Va. (12)	400	
U. S. Steel Corp.	Tralee, W. Va.	15	
Valley Camp Coal Co.	Alpoca, W. Va. Alpoca, W. Va. (4)	...	
Weirton Ice & Coal Co.	Alpoca, W. Va.	96	Deister Concentrator ¹ Western Machinery ¹⁶
Westmoreland Coal Co.	Alpoca, W. Va.	10	Elmco ²⁴ Cont. & Mech. Ind. ¹⁴
Winding Gulf Coal Co.	Alpoca, W. Va. Slab Fork, W. Va. Slab Fork, W. Va.	...	Kanawha ²¹ Heyl & Patterson ¹⁶ Elmco ²⁴ Kanawha ²¹
Wisconsin Steel Div.	Swords Creek, Va. Fultonham, Ohio	60	
Zacherl Coal Co.	Steubenville, Ohio Terre Haute, Ind.	100	
	Pinckneyville, Ill.	...	Western Machinery ¹⁶ Heyl & Patterson ¹⁶ McNally Pittsburg ²²
	Ceredo, W. Va.	1,000	Kanawha ²¹ Allen & Garcia ²⁵ Fairmont ¹⁵ Dorr-Oliver ¹⁶ Dorr-Oliver ¹⁶ Kanawha ²¹ Dorr-Oliver ¹⁶ Robert Holmes ²⁶ Jeffrey ²⁰
	New Eagle, Pa.	800	
	Corbin, Ky.	...	
	Shrewsbury, W. Va.	6	
	Triadelphia, W. Va.	100	
	Weirton, W. Va.	250	
	Hampton Mines, W. Va. (6)	144	Deister Concentrator ¹
	Hampton Mines, W. Va. (2)	48	Deister Concentrator ¹
	Hampton Mines, W. Va.	...	Dorr-Oliver ¹⁶ Heyl & Patterson ¹⁶ Fuel Process ²⁷ Link-Belt ²⁸
	Maben, W. Va.	...	
	MacAlpin, W. Va.	150	Deister Concentrator ¹ Elmco ²⁴ Heyl & Patterson ¹⁶ Irvin-McKelvey ²⁹
	Benham, Ky.	400	
	Lucinda, Pa.	...	

*Includes contracts for installation of new preparation equipment in existing structures. Where more than one equipment item was installed, the number, when known, is shown in the parentheses following the plant address.

1. Prime contractor. 2. Including H&P cyclones. 3. Conenco "77" Diagonal-Deck coal-washing tables with Conenco revolving feed distributors as follows: Amherst Coal, 2; Clinchfield, 4; Cornell Coke, 1; Jewell Ridge, 1; Slab Fork, 1; Westmoreland, 1. 4. Baum-type and diaphragm jigs. 5. Dorco FluoSolids drying system.

6. Cyclones for dust collection. 7. Including M-6 heavy-media separator. 8. Diaphragm jig.

unit washery. 9. Agidisc filter equipment. 10. Wemco Fagergren flotation cells.

11. SuperDuty Diagonal-Deck No. 7 table equipment. 12. DMS plant. 13. Including R&S Super Airflow tables and Neff & Fry silos, 2,000 tons. 14. C.M.I. centrifugal drying equipment. 15. H.M. equipment for rewash circuit.

16. Reineveld centrifugal drying equipment. 17. Second heavy-media jig-rewash unit, bringing total rewash capacity to 350 tph. 18. Wemco HMS drum separator. 19. Fine-coal plant, 120 tph. 20. Roller prefabricated heavy-media washer.

21. McNally fine-coal feldspar jig. 22. Oliver continuous horizontal filter. 23. Including, in addition to tables, two centrifugal dryers, 23

successfully drilled hard rock at a Pennsylvania anthracite mine. By using a water-check valve between two of the drill rods, the company eliminated water influx to holes. The water check permits the compressed air to flow toward the hammer but prevents backflow if the air supply is interrupted or shut off for any reason (*Coal Age*, May, 1958, p 114).

An improved vertical overburden drill serving two pits helped an Alabama operator slash drilling cost by one-third in thick, tough rock. A heavier drive and transmission plus greater use of hydraulic power for operating drill components contributed to increased drill capacity.

To get the most from explosives, the company also exercises care in charging blastholes. For example, a loose mixture of ammonium nitrate and fuel oil is poured into holes if there is no water inflow. If there is a small inflow of water, the mixture is packaged in polyethylene bags at the hole. But if water inflow is great, conventional explosives in water-resistant cartridges are used in the lower part of the hole. (*Coal Age*, July, 1958, p. 92).

A superior blasting system employing a mixture of oil and prilled clay-coated ammonium nitrate was developed by an Ohio operator. The system consists of using prills coated with 0.4% of anticaking agent. Two mixtures of oil are used: a 2% mixture for maximum sensitivity in the

H&P cyclones and H&P fluid-bed dryer. 24. Heavy-media system, Deister Concentrator table, centrifugal and thermal dryers. 25. Plant dust-collecting system, including Amerclone unit.

26. McNally Norton washer. 27. Multilouvre dryer. 28. McNally Norton unit system and washed-coal classification equipment in new plant built by company. 29. Bird filter unit. 30. American continuous vacuum filter and auxiliaries.

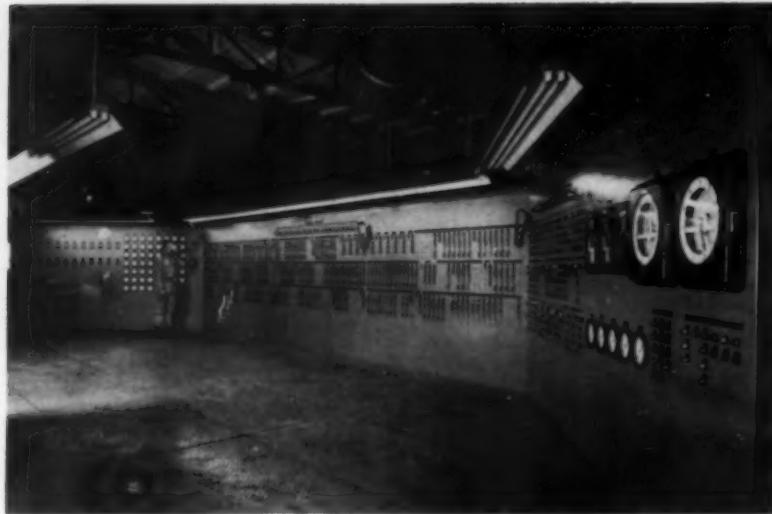
31. McNally Mogul washer. 32. Revision and remodelling. 33. Baughman thermal drying equipment. 34. Denver vacuum filter. 35. Denver Sub A flotation machine; Denver filter.

36. Type A Dorr thickener. 37. Unit washery. 38. Including McNally Norton washing equipment, centrifugal drying and cyclonic water collection. 39. Baum-type jig, Reineveld centrifuge, H&P cyclone, vacuum filter, H&P fluid-bed dryer. 40. Froth-flotation plant, including vacuum filtration and Wemco Fagergren cells.

41. H&P cyclones, centrifuge. 42. Kanawha-Belknap calcium-chloride washer. 43. Including McNally Pittsburg rotary breaker, two Mogul washers, two McNally Vissac downdraft dryers, and centrifugal drying equipment. 44. Automatic sampling installation with Galigher samplers and Syntron feeders. 45. Chance cone.

46. Two Dorco bowl desilters and two Dorr Torq thickeners. 47. Dorr Torq thickener. 48. Fine-coal circuit with Dorr thickener and Dorr-Oliver vacuum filter. 49. Baum jig. 50. Complete plant with air-pulsated jig, four No. 77 Diagonal-Deck tables (96 tph), centrifugal dryers and Elmco filter (15 tph).

51. Additional bin storage, raw and prepared coal. 52. Belknap washer. 53. Centrifugal dryer.



CONTROL CENTERS for new preparation plants grow in size as automatic controls make gains in more complex washing circuits. Central controls reduce labor.

priming charge, and 6% in the main charge. The company wraps 60-grain detonation fuse six times around the bag of priming charge to impart a high rate of detonation to the main charge. It is possible to modify the system by using a 6% mixture (*Coal Age*, June, 1958, p 128).

Up to 20% greater loading density and a significant saving in time and effort are advantages offered by a blow-charging machine undergoing field tests. Tests at an Ohio mine indicate that an 80-lb bag of granules can be mixed with 1 gal of fuel oil in 20 sec and then blown into a horizontal drillhole in 10 sec.

Better and lower cost tamping also is possible with the blow-charging machine. For example, it takes only 40c worth of sand to tamp a hole by the blowing technique whereas it costs \$2 per hole when conventional methods are used (*Coal Age*, November, 1958, p 88).

Bulk-handling procedures are cutting handling costs of make-your-own blasting agents at several western open pit mines. One bulk loader for vertical holes consists of a steel storage box, hoist, air compressor, oil storage tank and a measuring dispenser, all mounted on a flat-bed truck which is loaded from a 36-ton bin. A hole can be loaded with 200 to 300 lb of mixture in 20 sec.

Another company developed a mechanical mixing system for bulk loading vertical holes. The proper mixture of oil and nitrate is obtained by controlling the gravity flow of

nitrate out of a hopper and by metering the oil as it is sprayed into the falling nitrate stream.

A third western concern solved the handling problem by developing an air-loading procedure for charging holes angled upward at a 45-deg angle. Dry ammonium nitrate is first poured into the storage hopper of the loading device, from which it is let into an air tank. As air at 35 psi moves through a rubber hose, fuel oil is forced by air through an adjacent hose. The two meet at a junction point and flow through a pipe into the borehole at the rate of 100 lb in 100 sec (*Coal Age*, November, 1958, p 105).

Stripping Highlights

An eight-step system for contour stripping and augering makes it possible for a West Virginia operator to remove 95 ft of overburden while recovering 13 ft of coal from two seams. A vertical overburden drill, 8-yd dragline and two highwall augers are key machines in producing 200,000 tons per year (*Coal Age*, March, 1958, p 90).

High-capacity bulldozers removing cover without the aid of explosives and a highwall auger enable an Illinois operator to produce 1,000 tpd with only 13 men. A hydraulic tilt blade on one of the company's large bulldozers is effectively used to dig rock from depressions in the top of the coal and to cut ditches (*Coal Age*, April, 1958, p 116).

Electrically powered 6- and 8-yd draglines mounted on crawlers are used effectively to uncover a 25-ft-thick anthracite bed dipping 40 to 50 deg. The draglines are designed to hoist fast and spoil at long range while recovering second and third cuts in the pitching coal bed (*Coal Age*, May, 1958, p 114).

A 5-ft increase in dumping height and elimination of downtime caused by the hoist ropes slipping or breaking at the clamps are gains resulting from adapting a new-type rope clamp for the big 2½-in hoist ropes on a 60-yd shovel (*Coal Age*, June, 1958, p 88).

Longer digging life and lower maintenance cost resulted from a change to welded teeth for dragline buckets at an Illinois mine. All five components of a tooth are flamecut from Carilloy T-1 plate and are welded together with L-60 low-carbon automatic wire electrodes. The new teeth have a life of about 200 days (*Coal Age*, June, 1958, p 114).

A safer, simpler method of supporting the booms on Marion 5561 stripping shovels has been developed by an Ohio operator. As a result of engineering studies, the company substituted strands for wire ropes and developed a new, simpler gantry hitch for the strands (*Coal Age*, August, 1958, p 96).

To dig efficiently at depths up to 130 ft, an anthracite company purchased a 32-cu yd dragline with a 200-ft boom. Other equipment added to boost stripping range included a rotary dry-type overburden drill, rubber-mounted 6-yd front-end loader, and 8-yd dragline. The front-end coal loader handles 500 tph from stockpiles built up by the dragline (*Coal Age*, October, 1958, p 100).

Six 25-cu yd scrapers, push-loaded by big bulldozers, remove 1,800 to 2,000 cu yd per hour of friable sandstone which is broken up by powerful hydraulic rippers at one property. In working banks 50 to 60 ft high, the scrapers uncover a 100-ft-wide strip of coal (*Coal Age*, December, 1958, p 110).

Service Highlights

Low-cost aerial photography helps an Ohio operator to direct operations of its stripping equipment and aids in checking mining costs. Accurate maps of stripping areas are

prepared each month to make possible accurate, fast calculation of number of yards of overburden and tons of coal removed (*Coal Age*, September, 1958, p 113).

A special grease truck equipped with individual air-driven pumps for oil, greases and fuels insures clean lubricants for machines at an Alabama mine (*Coal Age*, July, 1958, p 92).

A new 7,500-V 300-amp metal-enclosed cable connector became available for use around mining properties (*Coal Age*, August, 1958, p 133).

Preparation

ADDITIONAL STEPS along the way to fully automatic plant control, greater emphasis on recovering as much coal as possible from the plant feed and the advent of new or improved washing, filtering and drying equipment were among the preparation highlights of 1958. Raw-coal storage and blending facilities also were added to make possible another plant operation and at the same time enable production to be independent of plant operation.

Froth flotation for recovery of ultrafine 28-mesh coal, particularly metallurgical grade, became increasingly popular in 1958, along with vacuum filters for dewatering the recovered product. Double-deck wet tables continued as a leader in cleaning fine coal. New anthracite facilities at one plant are designed to employ heavy media for removing wood chips from clean anthracite and a pre-cleaner for removing high-ash fines prior to pumping feed to the fine-coal plant.

A mechanical slate ejector was listed among the new facilities at a West Virginia plant. Pushbutton control of railroad cars with electric-pneumatic retarders gained as companies strove to eliminate the need for car droppers during the loading and weighing cycles.

A 5,500-ton raw-coal blending bin, twin-flow plant design, a new-type shaking sizing screen are incorporated in a West Virginia plant turning out 1,200 tph of clean coal. Ammeters for individual plant units are installed at the control panel-board so the plant operator can tell at a glance what the load is on each (*Coal Age*, April, 1958, p 102).

New Anthracite Preparation Facilities in 1958*

Coal Company	Plant Location	Capacity, TPH	Preparation Equipment
Beaver Brook Coal Co.	Beaver Brook, Pa.	90	Wilmot ¹
Black Heath Coal & Construction Co., Inc.	Cressona, Pa.	60 ²	Menzies Engr. ³
Blaschak Coal Co.	Mahanoy City, Pa.	14	Deister Concentrator ⁴
Colitz Coal Co.	Pottsville, Pa.	125	Wilmot ⁵
Crawson Equipment Co., Inc.	Marlin, Pa. (3)	100	Menzies Engr. ³
D. & Z. Coal Co.	Weigh Scales, Pa.	100	Menzies Engr. ³
Glen Alden Corp.	Audenreid, Pa.	300	Wilmot ⁶
Gowen Coal Co.	Gowen, Pa.	24	Deister Concentrator ⁷
M. A. Hanna Co.	Nanticoke, Pa.	100	Wilmot ⁸
Jeddo-Highland Coal Co.	Wilburton, Pa.	10	Deister Concentrator ⁹
Kocher Coal Co.	Midvalley, Pa.	150	Wilmot ¹⁰
Legal Coal Co.	Goodsprings, Pa. (2)	48	Deister Concentrator ¹¹
Moffat Coal Co.	Goodsprings, Pa.	100	Wilmot ¹⁰
Newkirk Mining Co.	Taylor, Pa.	300	Menzies Engr. ³
Oakwood Coal Co.	Tamaqua, Pa.	195	Wilmot ¹²
Reading Anthracite Co.	Pine Grove, Pa.	15	Deister Concentrator ¹³
Scutta Coal Co.	St. Nicholas, Pa. (2)	175	Wilmot ¹¹
Sykes Coal Co.	New Philadelphia, Pa. (2)	215	Wilmot ¹²
Tunnel Ridge Coal Co.	Mahanoy City, Pa.	100	Menzies Engr. ³
Underkoffer Coal Service	Ashland, Pa. (3)	24	Deister Concentrator ¹⁴
	Lykens, Pa.	11	Wilmot

*Includes contracts for installations of new equipment in existing structures. Where more than one equipment unit was installed, the number, when known, appears in parentheses after the plant address.

1. Hydrotator classifier equipment. 2. Including heavy-media unit and engineering for new fines plant incorporating present coal-washing tables. 3. Concenco "77" Diagonal-Deck coal-washing tables. 4. Wilmot heavy-media system. 5. New plant, including Menzies heavy-media

Another West Virginia company worked out some different yet practical combinations of new and old units to achieve the preparation standards of today's domestic and export markets. A combination of pick breaker and vibrating screen eliminates large rock, and two-stage cleaning with an existing jig and heavy-medium unit produces metallurgical and steam coal (*Coal Age*, April, 1958, p 122).

Addition of a heavy-medium processor for cleaning, a new-type heat unit for drying and adjustable-speed feeders for prescription blending enable a Utah operator to ship an accurately screened and precisely blended product averaging three percentage points lower in ash (*Coal Age*, May, 1958, p 100).

A new heavy-medium system finding increasing application in the anthracite features a three-product separation, low power consumption and a single drive on reclamation and sizing screens. Simplified medium reclamation is another feature as explained in *Coal Age*, July, 1958, p 80.

Automatic railroad car loading without the attention of an operator provides more continuous loading and increases plant efficiency at a Kentucky mine. Sensing switches operate controls for movement of cars, for

circuit and two 30-tph Menzies hydraulic fine-coal separators.

6. Menzies heavy-media circuit. 7. New plant with Wilmot heavy-media system and Hydrotator and Hydrotator classifier equipment. 8. SuperDuty Diagonal-Deck No. 7 tables. 9. Wilmot Hydrotator and Hydrotator classifier equipment. 10. Wilmot OCC heavy-media units.

11. Wilmot Hydrotator equipment. 12. Heavy-media system (40 tph) for chip removal, and fine-coal precipitator, 175 tph.

transferring loading chutes from one car to another and for reloading each car uniformly without an operator (*Coal Age*, June, 1958, p 94).

Two conveyor coal flows are mixed in the correct proportions under the control of an automatic electronic system which varies the speed of one belt to maintain a preset feed ratio between the two flows. The controls solved the problem of combining the outputs of two mines to produce a uniform high-quality coal for coking (*Coal Age*, August, 1958, p 106).

Tabling, classifying and flotation with cyclone thickening are employed to clean 150 tph of silt recovered from an old anthracite settling basin. A tractor-drawn scraper picks up a blend of material from different zones of the silt deposit (*Coal Age*, October, 1958, p 116).

An automatically-controlled spray system using a chemical additive for greater effectiveness solved a dust problem at one plant at a cost of less than 4 mills per ton. (*Coal Age*, February, 1958, p 164).

Cyclones charged with a heavy medium are cleaning 1,600 tph of fine coal at plants in western Europe. Vertically curved screens are generally used in the cyclone washing circuit to reduce the screen area required (*Coal Age*, December, 1958, p 118).

Improved day-by-day safety performance and a plague of disasters mark the extremes in coal's record last year.



INSTALLATION of more than 3,000,000 roof bolts per month contributes to roof-fall fatality-free operations in mining 98% of the Nation's coal.

Safety in 1958

HEARTENING and disheartening are the tones of safety news from the Nation's coal mines in 1958. As the year rolled along there was hope that unprecedented highs in safety performance would be achieved. The record at the end of September showed that fatality rates for the first 9 mo of 1958 were considerably improved as compared with the rates for the same period in 1957. Fatalities in 1958 occurred at rates of 0.76 per million tons of production and 0.98 per million man-hr of exposure. In 1957, for the same period, the rates were 0.97 per million tons and 1.21 per million man-hr.

However, in late October two disasters (accidents claiming more than five lives) occurred in West Virginia. These two, added to a West Virginia roof fall in February, 1958, which killed six men, pointed up the need for continuing and mounting pressure by all safety-minded men and agencies. The October disasters were explosions which took 36 lives.

Unrevised figures for the full year of 1958 show the rate to be 0.84 fatalities per million tons, against a rate of 0.92 in 1957. Not included in these figures is the sad experience of our neighbors in Nova Scotia, where

a major bump in October brought death to 76 men and forced the permanent abandonment of a large mine.

There were great achievements in 1958. In a 5½-mo period last year, 16½ million tons of coal were mined in Illinois without a single fatality. Other states scored remarkable successes in reducing mining fatalities. Although national production was down about 20%, West Virginia showed a 42% reduction in fatalities for the first 9 mo. Pennsylvania had a 47% reduction in the same period; Virginia, 42%; Utah, 62%; Illinois, 65%.

The one-year campaign to effect a 50% reduction in roof-fall injuries came to a close at mid-year with the result that a 39% reduction had in fact been achieved at the mines participating in the program. The Coal Mining Section of the National Safety Council petitioned the Council to continue the program.

Approximately 1,200 mines participated in the campaign. The result was that there were 509 fewer injuries caused by roof falls during the campaign year than were reported during the comparable base period.

It was reported during the year

that upwards of 3 million roof bolts a month are being installed in U. S. coal mines, and predictions are that bolt usage will rise to 6 million a month. First operating reports on VTI's (visual tension indicators) were released, showing that the effectiveness of bolting can be increased when supervisors have positive indication of bolt-loading conditions. (*Coal Age*, September, 1958, p 80). VTI's satisfactorily indicate proper bolt tension at time of installation and will show loosening or excessive loading after installation.

Great strides were made in other phases of operations in efforts to make the mines safer. At least one manufacturer has submitted to the Bureau of Mines for testing a system for continuous methane detection. The object is to provide preliminary warning to machine operators of methane buildup at the face, then to interrupt power to the face when the concentration of methane reaches a predetermined limit.

One company has found a valuable safety tool in photography. Accident-producing conditions and work habits are staged and photographed for distribution, bulletin-board display or publication in the company's employee paper. This technique has been effective in teaching safety. A full description appears in *Coal Age*, October, 1958, p 124.

U. S. Coal-Mine Fatalities in 1958 and 1957¹

Cause and Location	Bituminous				Anthracite				Total				
	Fatalities 1958	1957	Rate ² 1958	1957	Fatalities 1958	1957	Rate ² 1958	1957	Fatalities 1958	1957	Rate ² 1958	1957	
Falls of roof	152	195	0.38	0.40	18	27	0.82	1.07	170	222	0.40	0.43	
Falls of roof from knocking out support	3	4	.01	.01	1	...	.05	...	4	4	.01	.01
Falls of face, side rib, or pillar	3	2	.01	...	1	3	.05	.12	4	5	.01	.01	
Falls of roof or face, etc. from bumps, bursts	4	17	.01	.03	...	...	...	...	4	17	.01	.03
Inrush or water or material	43	53	.11	.11	...	5	...	.20	43	58	.10	.11
Haulage	Explosions: Minor	5	4	.01	.01	1	3	.05	.12	6	7	.01	.01
Explosives: Major	36	59	.09	.12	...	...	...	...	36	59	.09	.11
Explosives	7	7	.02	.01	1	4	.05	.16	8	11	.02	.02	
Electricity	14	12	.04	.02	...	1	...	.04	14	13	.03	.03
Machinery	11	17	.03	.03	...	...	...	...	11	17	.03	.03
Mine fires	3	2	.01	...	...	...	...	...	3	2	.01	...
All other	5	3	.01	.01	4	6	.18	.24	9	9	.02	.02	
Total underground	286	375	.72	.76	26	49	1.19	1.93	312	424	.74	.82	
Surface: Haulage	9	9	.02	.02	2	...	.09	...	11	9	.03	.02
Electricity	3	...	...	...	...	...	...	...	3	...	...	...
Machinery	2	6	.01	.01	1	1	.05	.04	3	7	.01	.01	
All other ⁴	8	8	.02	.02	...	1	...	.04	8	9	.02	.02
Total surface	19	26	.05	.05	3	2	.14	.08	22	28	.05	.05	
Strip mines: Haulage	5	8	.01	.02	2	...	.09	...	7	8	.02	.02
Electricity	1	2	...	...	...	...	...	...	1	2	...	...
Machinery	4	5	.01	.01	...	...	...	...	4	5	.01	.01
All other	6	7	.02	.01	1	...	.05	...	7	7	.02	.01
Total strip	16	22	.04	.04	3	...	.14	...	19	22	.05	.04
Auger mines: Falls of roof or face	...	1	...	...	...	...	...	...	...	1	...	...
Haulage	...	...	...	...	...	...	...	...	...	...	...	...
Explosions: Minor	1	...	...	...	...	...	...	...	...	1	...	...
Major	...	...	...	...	...	...	...	...	...	...	...	...
Machinery	2	1	.01	...	...	...	...	...	2	1	...	...
Suffocation	1	...	...	...	...	...	...	...	1	...	...	...
All other	...	...	...	...	...	...	...	...	...	...	...	...
Total auger	3	3	.01	.01	...	...	...	...	3	3	.01	.01
Grand total	324	426	.61	.86	32	51	1.46	2.01	356	477	.84	.92	

¹ All figures are subject to revision. ² Fatalities per million short tons. ³ Less than 0.005. ⁴ Includes 1 surface fatality from fall of roof underground in Kentucky, 1958. (Source: U. S. Bureau of Mines.)

There was in 1958 growing interest in the development of plans for providing auxiliary face ventilation. Proposals included stationary auxiliary fans and tubing and special units mounted directly on face machines, specifically continuous miners. See the article entitled, "ABC's of Ventilation for Continuous Miners," beginning on p 96 in this issue.

A research project was conducted into the possibility of suppressing dust at the face by the use of foam. Preliminary reports indicate that several difficulties must be overcome, but interest continues in the possibility. Also in safety research, field trials were run on drilling from the surface in advance of underground mining as a means of introducing strata-binding adhesives. This, too, requires further work, but the start has been made.

In strip and highwall mining also safety was stressed. Operators and

supervisors conducted ambitious safety programs, stressing the need for care, caution and alertness in the use of heavy equipment, in handling large quantities of explosives and in operating large haulage units. In highwall mining, trimming and scaling of the highwall prior to mining was noted as the first order of business.

Winners of "Sentinels of Safety" trophies in the 33rd National Safety Competition sponsored by the Bureau of Mines were Republic mine, Republic Steel Corp., Elkhorn City, Ky., in bituminous, and Pine Knot colliery, Reading Anthracite Co., Minersville, Pa., in anthracite. Trophies were provided by *Explosives Engineers Magazine*, a publication of Hercules Powder Co. Republic mine posted a record of 418,198 man-hr of operation without a lost-time injury. Pine Knot worked 180,915 man-hr with 12 disabling injuries causing a total lost

time of 312 days.

At the annual awards night of the Big Sandy-Elkhorn Coal Mining Institute 110 awards were presented to supervisors for accident-free direction of their men. Among the winners were Noah Akers, Bethlehem Mines Corp., Jenkins, Ky., and W. A. Pack, Inland Steel Co., Wheelwright, Ky., who had achieved identical records of 13 yr supervision without disabling injury to any of the men under their direction.

Safety training merited important consideration again in 1958. A number of companies availed themselves of retraining courses in accident prevention offered by the Bureau of Mines, and during the year the Bureau offered a new course in fundamentals of coal-mine accident prevention. The course is intended to provide a firm foundation for existing training efforts and can be completed in 16 hr.

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*says W. Pershing Stahlman
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1958 Sales of Coal-Mine Equipment

By W. H. Young, Chief, Bituminous Coal and Lignite Section

And R. L. Anderson, Supervisory Commodity-Industry Analyst, U. S. Bureau of Mines

SHIPMENTS of mechanical loading equipment for underground use in coal mines in the United States, in terms of capacity, decreased 38% in 1958 from 1957. The capacity of mechanical cleaning equipment sold for use at bituminous mines was 22% less. Shipments of all major types of mechanical loading and conveying equipment decreased in 1958.

This survey was made possible by the cooperation of all known manufacturers of mechanical cleaning equipment for bituminous mines and of mechanical loading and supplementary haulage equipment and coal-recovery augers for use in all coal mines in the United States. Information from various trade journals also was used.

Sales of mechanical-loading units, coal-recovery augers and supplementary haulage equipment in 1958, as in previous years, represent shipments during the year. Of the total capacity of mechanical-cleaning equipment sold in 1958, 34% was placed in operation during that year. The remainder (66%) will be installed later.

Mechanical Loading and Mining

Bituminous coal and lignite mechanically loaded in underground mines decreased from 306 million tons in 1957 to an estimated 239 million in 1958. Production at strip mines decreased from 124 million to an estimated 109 million tons, and auger-mine production decreased from 8 million to 7 million tons during the same period.

Table I shows data on bituminous and lignite production by methods of

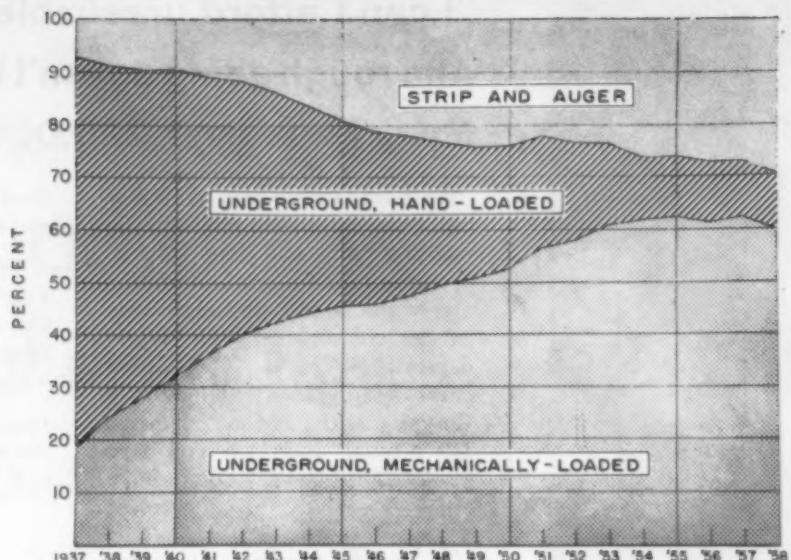


FIG. 1 — PERCENTAGE OF TOTAL PRODUCTION of bituminous coal and lignite in the U. S., 1937-58, by types of mining and loading.

Table I—U.S. Bituminous and Lignite Production, By Methods of Mining and Cleaning, 1956-58

	1956		1957		1958*	
	Thousand Net Tons	Percent	Thousand Net Tons	Percent	Thousand Net Tons	Percent
Hand-loaded underground.....	58,372	11.6	54,912	11.1	42,000	10.6
Mechanically loaded underground...	307,402	61.4	305,737	62.1	239,000	60.2
Mined at auger mines.....	8,045	1.6	7,946	1.6	7,000	1.8
Mined by stripping.....	127,055	25.4	124,109	25.2	109,000	27.4
Total production.....	500,874	100.0	492,704	100.0	397,000	100.0
Mechanically cleaned.....	292,365	58.4	304,027	61.7	265,000	66.8

*Preliminary.

Table II—Underground Bituminous and Lignite Production, By Methods of Loading, 1956-58

	1956		1957		1958*	
	Thousand Net Tons	Percent	Thousand Net Tons	Percent	Thousand Net Tons	Percent
Mobile loading machines:						
Loading direct into mine cars.....	35,428	9.7	24,797	6.9	...	...
Loading onto conveyors.....	14,069	3.8	14,419	4.0	...	...
Loading into shuttle cars.....	198,844	54.3	197,506	54.8	...	...
Continuous mining machines.....	39,907	10.9	53,783	14.9	...	...
Scrapers.....	156	...	81	...	...	...
Conveyors equipped with duckbills or other self-loading heads.....	3,727	1.0	2,699	0.7	...	...
Hand-loaded conveyors.....	15,271	4.3	12,453	3.5	...	...
Total mechanically loaded.....	307,402	84.0	305,737	84.8	239,000	85.1
Hand-loaded into mine cars.....	58,372	16.0	54,912	15.2	42,000	14.9
Total underground production....	365,774	100.0	360,649	100.0	281,000	100.0

*Preliminary. ¹Included with "Total mechanically loaded."

mining and mechanical cleaning for 1956-58, inclusive. The percentage of total production of bituminous coal and lignite in the United States, 1937-

58, by type of mining and loading, is shown in Fig. 1. The percentage of total output mechanically cleaned increased in 1958 over 1957. During

1958, almost 90% of the total output was mechanically loaded at underground mines, loaded by power shovels at strip mines, or mined by augers along highwalls in strip mines.

Underground production of bituminous coal and lignite, by methods of loading, is listed in Table II. It is estimated that the percentage of underground production mechanically loaded in 1958 was higher than the previous year.

Auger Mining—Separate data on the number of augers in use and the tonnage produced by auger mining were first collected for 1952.

Reports from four manufacturers of coal-recovery augers show that 45 augers were shipped in 1958 compared with 55 in 1957, a decrease of 18%. All augers shipped in 1958 were for surface use, except one to Tennessee and the three to Pennsylvania anthracite for underground use. Table III shows coal-recovery auger shipments in 1954-58, and Table V the number in use in 1957 and shipments in 1958, by states.

Types of Units Sold—Table III lists the units of mechanical loading and mining equipment shipped for use at coal mines in the United States, 1954-58, inclusive. Shipments of practically all equipment decreased in 1958. However, one scraper loader was shipped to a bituminous coal mine, the first in 4 yr, and three augers were shipped for underground use at Pennsylvania anthracite mines against two in the previous year.

Exports of underground mechanical-loading equipment, in terms of capacity, were 15% of the shipments to U. S. mines in both 1957 and 1958.

Types of Mechanical Loading Equipment Sold Compared With Units in Use—Table IV shows the trend in demand for various types of mechanical-loading equipment. Continuous mining machines were first used in 1948. However, the number in use was not shown separately until 1952. That number has increased every year from 1952 to 1957. Shipments of continuous mining machines in 1958 were 17% of the number in use in 1957. Mobile loading machine shipments in 1958 were 3%.

Table V shows the number of mechanical-loading units and coal-recovery augers shipped to various states in 1958, compared with the number

Table III—Mechanical Loading and Mining Equipment Sold for Use in Coal Mines, as Reported by Manufacturers

	1954	1955	1956	1957	1958	Change from 1957 (Percent)
Bituminous and lignite mines:						
Mobile loading machines	92	120	239	209	97	-53.6
Continuous-mining machines	101	109	154	168	107	-36.3
Coal-recovery augers	55	65	89	53	42	-20.8
Scrapers ¹	5	...	...	...	1	...
Shuttle cars	242	348	560	488	181	-62.9
Gathering and haulage conveyors ²	19	78	137	172	97	-43.6
Room or transfer conveyors ³	61	143	232	159	92	-42.1
Bridge conveyors	...	...	128	96	66	-31.2
Anthracite mines (Pennsylvania):						
Mobile loading machines	17	1	...	1	...	-100.0
Continuous mining machines	1	...	...	1	...	-100.0
Coal-recovery augers	...	1	...	2	3	+50.0
Scrapers ¹	...	2	...	...	...	...
Shuttle cars	14	8	2	2	...	-100.0
Gathering and haulage conveyors ²	...	3	...	2	...	-100.0
Room or transfer conveyors ³	24	7	19	45	21	-53.3
Bridge conveyors	...	...	1	...	...	-100.0
Number manufacturers reporting	23	22	22	21	18	...

¹ Reported as scrapers or scraper haulers and hoists. ² Includes all haulage conveyors with a capacity over 500 ft, except main slope conveyors. ³ Includes all haulage conveyors with a capacity of 100 to 500 ft, except main slope conveyors. ⁴ Not available.

Table IV—Sales of Mechanical-Loading Equipment in 1958 Compared With Machines in Use in Preceding Years

	Number Machines Reported in Use					Sales, 1958
	1953	1954	1955	1956	1957	
Bituminous and lignite mines:						
Mobile loading machines	3,985	4,314	3,819	3,854	3,755	97
Continuous mining machines	219	325	385	510	614	107
Scrapers	29	48	23	35	14	1
Conveyors equipped with duckbills or other self-loading heads	849	633	487	437	361	...
Hand-loaded room conveyors, number of units	2,994	2,162	1,925	1,819	1,528	92
Anthracite mines (Pennsylvania):						
Mobile loading machines	39	68	79	80	66	...
Continuous mining machines	489	359	279	303	295	...
Scrapers	489	359	279	303	295	...
Hand-loaded room conveyors, number of units ²	2,784	2,277	1,940	1,593	1,437	21

¹ Sales of conveyors equipped with duckbills or other self-loading heads are included with hand-loaded room conveyors. ² Includes pit-car loaders and conveyors equipped with duckbills or other self-loading heads.

in use in 1957, as reported by mine operators. Sales of room conveyors as listed in Table V are not exactly comparable with the number of room conveyors in use. To avoid duplication in tonnage mechanically loaded, each mine operator was instructed to report "hand-loaded" and "self-loading" conveyor tonnage only. Therefore, conveyors loaded by mobile loading machines and continuous mining machines are not included with "Room conveyors in use in 1957." Shipments of coal-recovery augers to bituminous mines in 1958 were 14% of the total in use in 1957.

Haulage Equipment

Bridge Conveyors—Sales of bridge conveyors decreased from 97 in 1957 to 66 in 1958, or 32%. Shipments by states are listed in Table VI.

Shuttle Cars—Sales of shuttle cars decreased from 490 in 1957 to 181 in 1958. Details of shipments to various states are given in Table VI.

Gathering and Haulage Conveyors—For the purpose of this study "Gathering and haulage conveyors" (formerly listed as "mother" conveyors) include sectional extensible power-driven conveyor units that can handle

Table V—Mechanical-Loading and Mining Equipment in Use in 1957, by States, Compared With Sales Reported in 1958

	Mobile Loading		Continuous		Room Con-		Coal-Recovery	
	Machines	In Use, Sales, 1957	Miners	In Use, Sales, 1957	Scrapers	In Use, Sales, 1957	Conveyors ¹	Augers
Alabama	117	12	12	3	...	104	4	1
Alaska	5	...	1	...	1	8	...	...
Arkansas	...	...	1	...	...	22	...	...
Colorado	60	1	9	3	3	156	1	...
Illinois	179	...	38	3	...	8	...	...
Indiana	78	3	4	1	...	...	...	...
Iowa	5	...	...	...	...	...	...	...
Kentucky	574	16	30	11	...	100	6	64
Maryland	...	...	...	...	...	18	...	...
Montana, bituminous	9	...	...	...	...	9	...	...
New Mexico	2	...	...	...	...	1	...	...
North Dakota	...	...	...	...	...	...	...	...
Montana, lignite	2	...	...	...	...	...	...	...
Ohio	117	1	34	3	...	21	1	42
Oklahoma	5	...	...	...	...	78	...	...
Pennsylvania	794	8	291	24	2	1	509	14
Tennessee	35	1	...	...	1	25	...	11
Utah	152	...	16	1	...	8	...	...
Virginia	171	10	18	1	...	25	4	27
Washington	3	...	6	...	2	20	...	...
West Virginia	1,420	45	152	57	...	666	62	113
Wyoming	27	...	2	...	6	111	...	...
Total	3,755	97	614	107	14	1,889	92	304
Anthracite mines (Pennsylvania)	66	...	...	...	295	...	1,437 ²	21
Grand total	3,821	97	614	107	309	1	3,326	113
						...	...	45

¹ Includes hand-loaded conveyors and conveyors equipped with duckbills or other self-loading heads. ² Also includes pit-car loaders. ³ Data not available.

Table VII—Bituminous Coal Mechanically Cleaned in 1957, Compared With 1958 Sales of Equipment

	1957		Annual Capacity of Equipment Sold in 1958 (Net Tons) ¹
	Number Plants in Operation	Net Tons Cleaned Coal	
Alabama	34	12,417,096	93.6
Alaska	3	311,136	36.9
Arkansas	...	...	...
Colorado	5	1,394,913 ²	38.8 ³
Illinois	60	42,455,159	90.3
Indiana	21	11,587,572	73.1
Kansas	3	583,704	77.9
Kentucky	87	43,264,992	57.9
Maryland	...	...	...
Missouri	11	2,744,594	92.2
Montana	2	10,531	2.7
New Mexico	1	21,646	15.8
Ohio	26	16,657,808	45.2
Oklahoma	3	600,522	27.4
Pennsylvania	99	52,601,639	61.6
Tennessee	4	722,462	9.1
Utah	5	2,986,881	43.6
Virginia	30	13,304,259	45.1
Washington	4	336,070	93.3
West Virginia	194	102,017,793	65.0
Wyoming	1	8,417	0.4
Undistributed	...	...	520,000
Total	593	304,027,194	61.7
			14,705,000

¹ Based on average days mines were active in 1957 and 7.0 hr per day. ² Included in "Undistributed." ³ Arkansas included with Colorado.

Table VI—Units of Conveying Equipment Sold for Use in Coal Mines, 1957-58, by States

	Bridge Conveyors		Shuttle Cars		Gathering and Haulage Conveyors ¹	
	1957	1958	1957	1958	1957	1958
Alabama	7	6	49	7	2	1
Colorado	...	...	5	3	2	...
Illinois	...	...	4	4	6	5
Indiana	...	...	3	8	1	8
Kentucky	16	3	30	39	15	7
New Mexico	...	...	2	2	...	...
Ohio	...	1	...	2	16	...
Oklahoma	1	...	...	...	2	...
Pennsylvania	14	11	99	18	40	14
Tennessee	...	...	2	...	1	...
Utah	...	...	30	7	5	1
Virginia	7	1	21	24	9	18
West Virginia	51	44	241	67	73	43
Wyoming	...	...	2	...	...	...
Total	96	66	488	181	172	97
Anthracite mines (Penns.)	1	...	2	...	2	...
Grand total	97	66	490	181	174	97

¹ Includes all gathering and haulage conveyors with capacity over 500 ft, except main slope conveyors.

over 500 ft of conveyor. Main slope conveyors are excluded. Table III lists sales for 1954-58, inclusive, and Table VI shows shipments of these conveyors by states.

Mechanical Cleaning

Reports from 21 manufacturers of bituminous coal-cleaning equipment show that the total capacity of 1958 sales was 10,350 net tons of clean coal per hour, compared with 13,225 tons sold in 1957, or a decrease of 22%. Sales in 1958, in terms of capacity, show that jigs ranked first, followed by dense medium and wet tables. The capacity of all types of equipment sold in 1958 for cleaning bituminous coal by wet methods was equivalent to 5% of the total cleaned by wet methods in 1957, and the capacity of pneumatic equipment sold in 1958 was 3% of the tonnage pneumatically cleaned in 1957. Approximately 50% of the total capacity sold in 1958 was for additions. The remainder of the capacity comprised new plants.

Table VII gives data on bituminous coal cleaned in 1957, and the annual capacity of equipment sold in 1958, by states.



Adverse haul conditions reducing your output?

Put your hauling operation on a high-production basis — despite restricted areas, rough winding roads, or bad weather conditions — with rugged LeTourneau-Westinghouse Tournapull® Rear-Dumps. Here's how these pivot-steer haulers can cut minutes off your haul cycles.

Speeds loading — Because the Tournapull prime-mover pivots 90° right or left, you can place L-W Rear-Dumps under the shovel *quick*. Low, wide bowl-opening gives shovel operator big, easy target... cuts spillage. Production delay for cleanup of pit-floor is minimized. Three-layer, all-steel bowl floor withstands pounding of heavy rocks. Sloping sides deflect load shock, cushion floor area with layer of material.

Hauls anywhere — Equipped with exclusive power-transfer differential, L-W Rear-Dump keeps load moving steadily through mud and slippery footing, over uneven ground, and around sharp turns. Big, low-pressure tires give top flotation — low center of gravity assures stability on uneven terrain.

Dumps quick, clean — Flick of switch on control panel instantly activates point-of-action electric hoist-motor. Body raises quickly, to

desired angle. At full-dump position, edge of bowl is low behind rear wheels. Material dumps clean. It cannot roll forward to lodge against wheels, nor pile under rear end. Streamlined body sheds stickiest material readily.

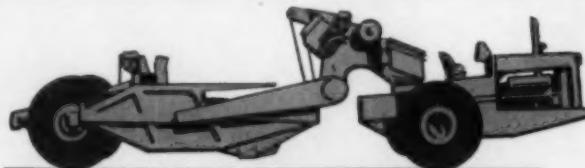
Safe, effortless control — Both dumping and steering are actuated by a quick, simple fingertip movement on electric switches. Giant air brakes — combined with Electrotarder, for auxiliary non-wear fly-wheel brake power — add safety.

Maintenance is low, because highly-simplified L-W Rear-Dumps eliminate so many vulnerable parts that cause trouble on conventional haulers. All-welded, reinforced steel bowl resists toughest wear and shock.

Compare its performance

Let us demonstrate a haul-anywhere L-W Rear-Dump at your pit. Compare its time-saving performance against your present haulers. Select from 3 sizes: 11, 22, and 35 tons. Call or write for complete information.

R-1862-MQ-1



Converts to easy-loading scraper

When rock-hauling work is completed, you can interchange the L-W Rear-Dump trail-unit with an easy-loading scraper, behind the basic Tournapull prime-mover. You'll then have a double-duty tool for stripping and roadbuilding — or to rent out profitably for all types of earthmoving projects. Scraper is available for about $\frac{1}{4}$ the cost of complete original L-W Rear-Dump. Other specialized trail-units to increase prime-mover's usefulness also available.



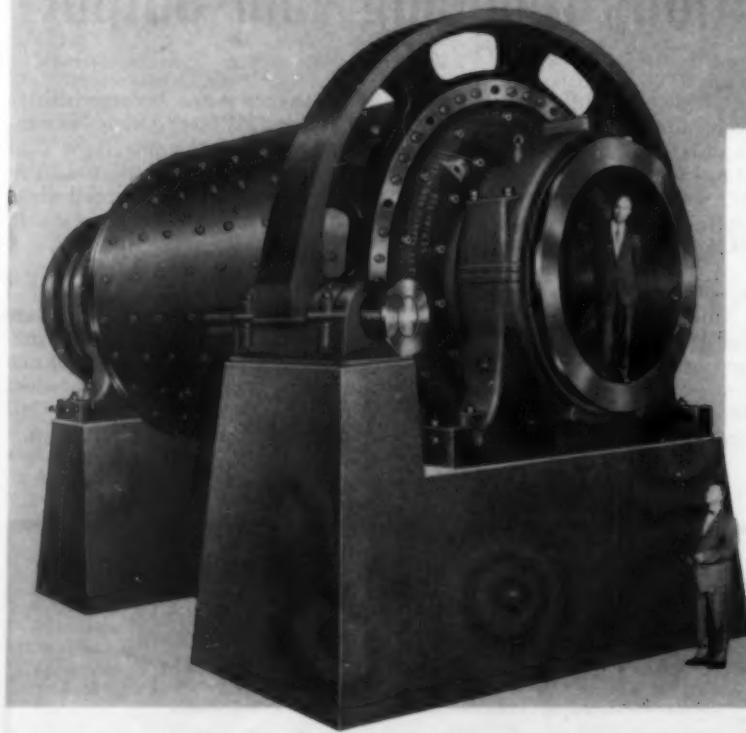
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A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

ECONOMIZE with built-in REOPCO*

Marcy Mills have a reputation for being
the best built grinding mills available...that's why
they cost less to own
save you money every day, for years.



One of two 12½' x 16' Marcy Open End Rod Mills, the largest rod mills ever built, designed by Mine and Smelter to meet a specific large tonnage grinding problem. Compared with using 3 or 4 smaller mills they have the advantage of lower initial cost, less floor space, more efficient grinding, less power per ton, and lower labor costs...a typical example of how Marcy experience and engineering too, can save you money.

*Reduced operating costs.

Check Marcy Performance Records with our Engineers

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Want to cut your pit-haul costs?

How 15-speed "blade" can help your haulers make extra pit-to-plant trips every day

You'll reduce the per-ton cost of hauling, boost pit output every day, by traveling your haulers at higher speed. Faster haul speeds are practical *only* when your pit floor, benches, and haul roads are kept clean, smooth, and well drained. The better your surface, the faster you haul... the more trips per day, the lower your pit-haul costs.

To keep your haul routes in tip-top shape you need graders that can do maximum work. You need machines that can make heavier cuts, push bigger loads, work and travel faster... machines that can always work your tough materials at, or near, full power. This requires a wider range, and more selective gear-ratios than most graders afford.

Only Adams* 80 to 160 hp graders give you the extra work-speeds you need. They provide 8 standard speeds forward and 4 reverse, plus 3 creeper gears (opt.)... that's 15 speeds in constant-mesh transmission.

More speeds for full-power work

For building and maintaining haul roads, ditching, and clean-up at pit, plant, and stockpile, Adams gives you 4 efficient forward working speeds. Other graders with 6 forward speeds have only 3 working gears... often cannot develop full push-power at the faster speeds that are "just right" for the job.

Adams' 2 intermediate gears, 10 and 14 mph, are handy for light, fast

blading, snow plowing, maneuvering and climbing tough grades. And travel speeds to 26 mph save time between grading assignments... time that can be used for extra blade-work.

Up to 30% more push-cycles on one-way grading

Most graders have only 2 reverse gears... about 3 and 7 mph. Adams has 4 reverse speeds—2 for working, 2 for high-speed back-up. Adams' top reverse speeds (8 and 13 mph) pay big dividends. Often your operator works a 200' to 400' stretch, or even more, that is too short or too confined to make turning-around worthwhile. Instead, he backs-up. The Adams makes the reverse trip fast... converts usually wasted travel-time to extra blade-work.

Creeper gears for added "muscle", precise control of grade

Three optional creeper speeds, 31' to 160' per min. (full power, 0.41 to 1.82 mph), afford a means to concentrate full engine-power for ripping-up and regrading old roadways, pioneering for exploration and new roads, clearing overburden of stumps and roots and working thru rocky ground. They eliminate the costly common practice of "slipping the clutch" at high rpm to get maximum power at slow speed... reduce shock and clutch wear. Creepers also help you cut more accurate grades, and work in tight places.

190 and 135 hp POWER-Flow® Graders

For maximum push-power *at all speeds*, Adams POWER-Flow 660 and 550 torque-converter models give you the effective work-power of an *infinite* number of gear ratios, from 0.0 mph to 27 mph forward.

Any one of the 7 Adams graders—190, 160, 135, 123, 115, 80, and 60 hp—will handle more work per \$ investment. In any size, Adams model graders will keep your haul routes smoother—at less cost than any other method. Call us for full details on these modern graders built by LeTourneau-Westinghouse.



Adams graders can handle more of your type of jobs, save time and money with efficient interchangeable attachments. These include: Scarifier for ripping-up old roadways and rock-filled soil, bulldozer for spreading and casting dirt and road materials, snow equipment for clearing roads, push-plate for push-loading scrapers and starting balky haulers.

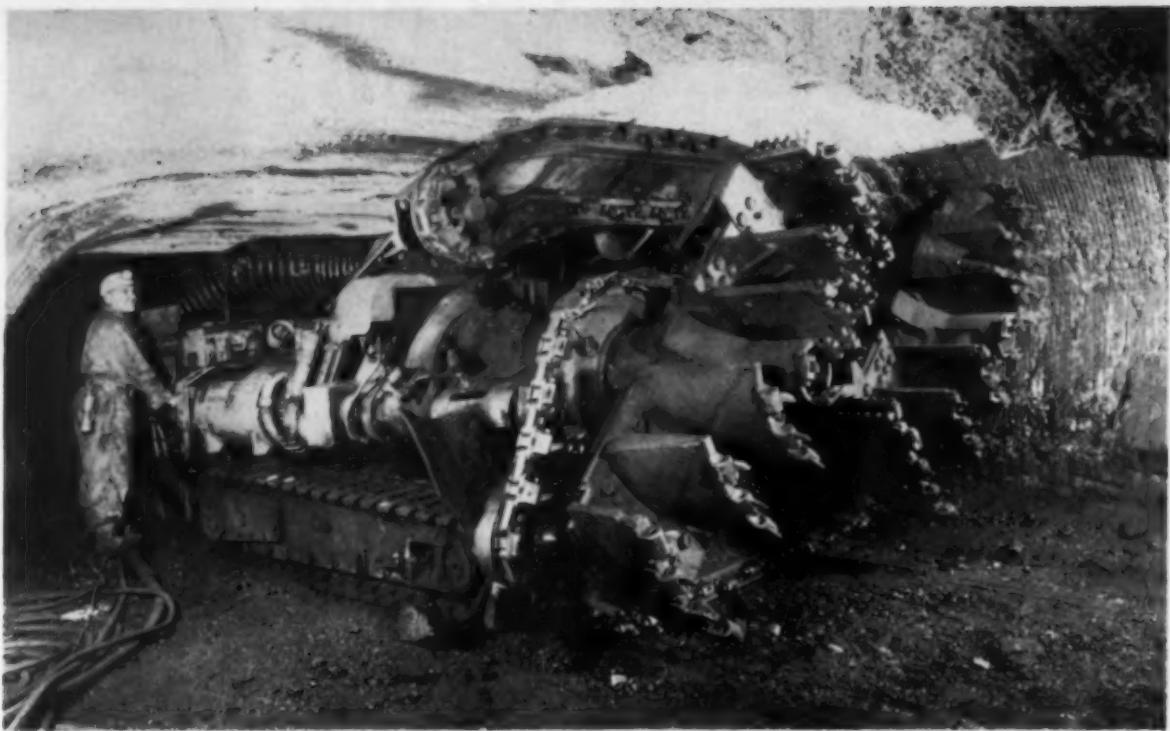
*Trademark G-1626-MQ-1

LETOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS



A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

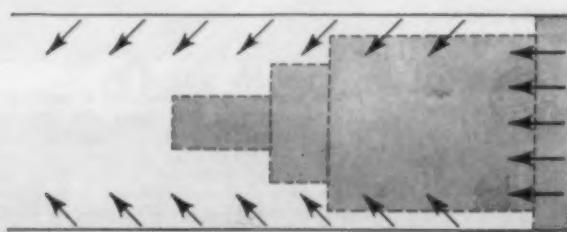


NEW APPROACHES to the problems of ventilation and dust control with continuous miners include the dust-collector-and-tubing setup shown on this boring-type miner. In addition to eliminating dust, the collector helps maintain air velocity and turbulence at the face for more-effective methane removal.

The ABC's of Ventilation For Continuous Miners

High steady-rate emissions and space occupied by miners are major problems, along with getting velocity and clearing action in front of the units. Means of solving these problems include, in addition to brattice lines, blowers and tubing, including small auxiliary blowers at or on machine.

Main Problem



Steady rate gas liberation at the face is the main problem in ventilation with continuous miners. This means that gas, if present, is always with you. In con-

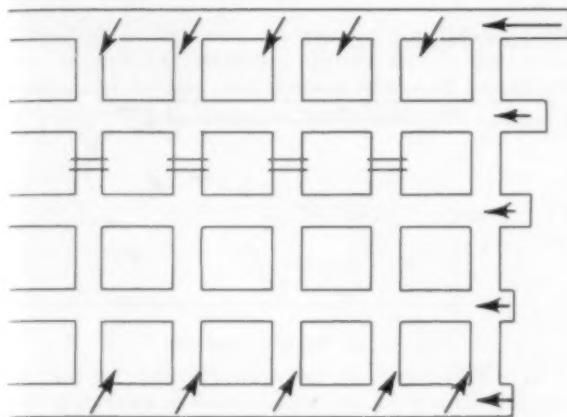
ventional mining, in contrast, the usual pattern is a surge when a cut is shot, and then a relatively low liberation rate afterward.

Liberation rates up to 200 cfm or more have been encountered in continuous mining, and rates up to 20 to 50 cfm are not uncommon. At 20 cfm, with a limit of 1% methane in the air leaving the place, 2,000 cfm theoretically would be sufficient. Actually much more may be required depending on the ventilation system employed.

A big problem, particularly with boring-type units almost completely filling the place is, however, concentrations in corners and immediately ahead of the cutters. These concentrations, in the absence of specific steps to break them up, can—and have—reached 10% or more.

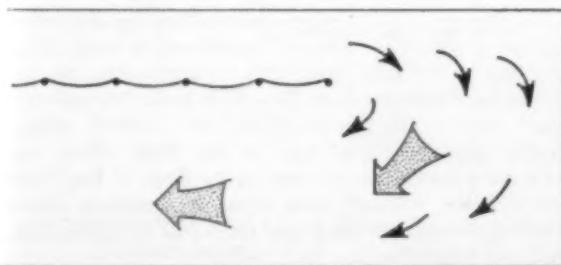
Consequently, for liberations of around 15 cfm, field trials with brattice indicate that air flow should be 5,000 cfm or more for the maintenance of reasonably safe conditions.

Secondary Problem



Bleeding into the working openings or working area from the ribs on either side—particularly in virgin coal—further increases the section gas load in many mines and with it the air requirements. This, again, is primarily the result of speed of advance. With continuous miners, sections are worked out 3 to 4 times faster. Consequently, 3 to 4 times the methane quantities would be released in a given time. Earlier, slower types of mining facilitated liberation from ribs through cracks and fissures resulting from shooting, in addition to increasing the time available for liberation.

Auxiliary Problem



Dust flow to machine operators and others working in the place results in discomfort and low visibility, with attendant hazards, when intaking is behind a brattice line. If coursing is reversed and intaking is done on the wide side dust is carried away from the men but enough air velocity at the face may be difficult to attain.

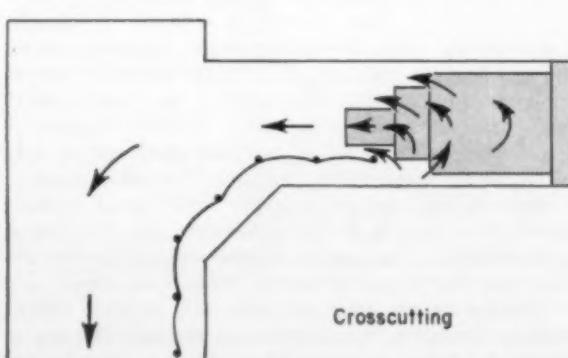
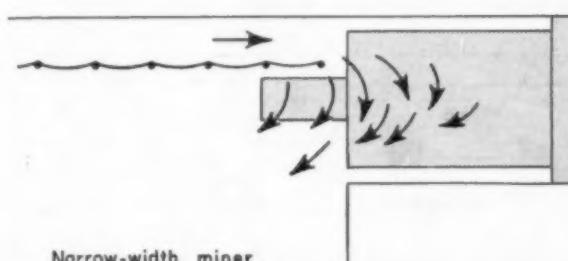
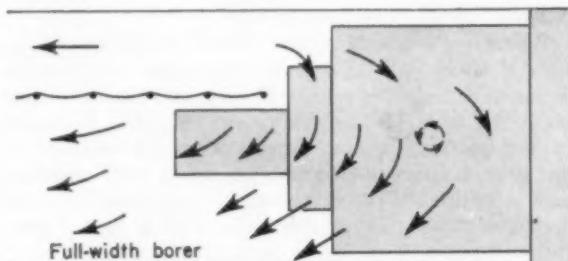
Normally, of course, dust is supposed to be taken care of by sprays, but if they fail or are not fully effective dust can become a real factor, not only from the environmental standpoint but also because of excessive deposition on ribs, roof and floor, adding to the rock-dusting problem.

Ventilation Systems

Brattice—Narrow-Side Intake

The brattice line is, to date, the most widely employed means of conducting air to the face. When boring units are employed, intaking behind the brattice line is a necessity to raise the velocity and drive the air farther toward the face and keep the velocity up for the necessary sweeping action.

Good results are being achieved where methane liberations are not too great. In one mine, for example, brattice provides 10 sq ft of intake area and transmits 6,000 cfm 70 to 80 ft from the crosscut, with good clearing action at the face when assisted by convection, the agitating action of the cutting arms and the exhaust from the motor blowers on the machine.



Velocity dropoff is the critical factor in brattice-line service, since it seldom is possible to get the line any closer than the operator's position. Frequently it must be terminated even farther back. With a velocity of, say, 200 fpm at the brattice discharge, the dropoff 5 ft ahead

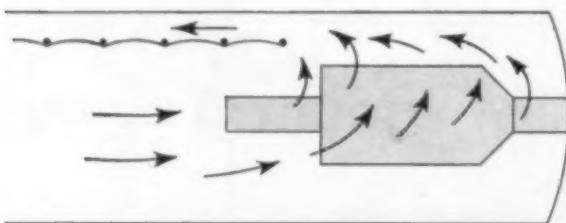
Coal Age Special Report . . .

cuts velocity to 100 fpm or less; 10 ft ahead, to around 50 fpm; and 25 ft ahead, down to around 20 fpm with a boring-type unit in the face. From this it can be seen that the sweeping and diluting action decreases very rapidly with narrow-side intaking, emphasizing the need for keeping the line up and also the need for reducing air loss to the minimum, since methane percentage, with a given inflow, rises rapidly as velocity drops off.

Brattice also complicates moving boring-type units back in shifting from place to place, though the additional retraction being built into the newer models is helping in this respect. Also, if a pickup loader and shuttle cars are employed, anchoring the brattice to the floor results in trouble and damage to the line. As a result, some companies, using spuds, fasten the lower part of the canvas up on the rib to make a triangular duct. With sufficient coal thickness, cross-sectional areas up to 10 sq ft or more are possible, transmitting up to 6,000 cfm at distances up to 70 to 80 ft or more.

When larger quantities are required to handle liberations of 50 to 100 cfm or more, ventilation with brattice becomes a major operation. If, say, 20,000 cfm is required for adequate face ventilation, ventilation by means of line brattice becomes virtually impossible because of the large pressure differentials necessary, with resultant high velocities and excessive leakage. Consequently, where high liberations are encountered the trend is toward positive ventilation by tubing blowers or exhausters.

Brattice—Wide-Side Intake

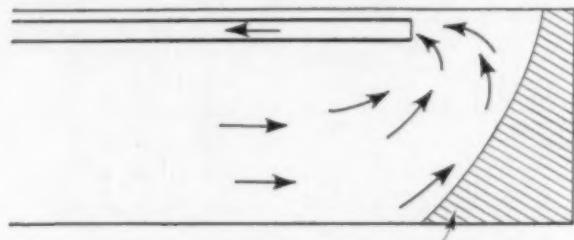


Since cross-sectional area is greatly increased by intaking on the wide side, velocity is reduced accordingly. Consequently, where boring-type miners completely covering the face are employed, it is almost impossible to get sufficient quantity and velocity along the face to dilute and clear out anything beyond a nominal quantity of gas. With ripper and other machines which occupy only a part of the cross-section, this drop in velocity is not as critical, though the air tends to short circuit without traveling to the face. The men, however, gain the comfort and visibility advantages of always working in clear air, since the dust is always carried away from them.

Intaking on the wide side also can facilitate mining without having to take equipment through curtains or checks but brings in the problem of keeping the brattice line far enough from the rib to maintain the necessary return. Solutions include, in one instance using roof bolts slightly longer than seam thickness. The bolts are sprung into place and the canvas is laid against them. At this particular property, also, using ripper-type equipment, the line is moved to the center of the place when the

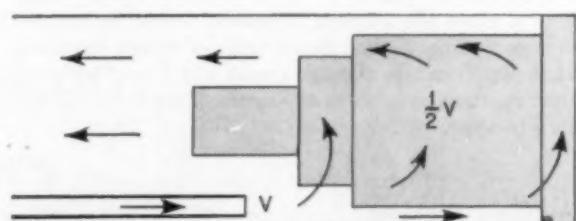
machine moves to drive the adjoining opening up to the crosscut. This can be done because the place will not be required for equipment again, since the opening will be picked up from the next crosscut. Moving provides more area for air travel and also lessens the possibility of interruption if one of the brattice supports is dislodged.

Exhaust Tubing



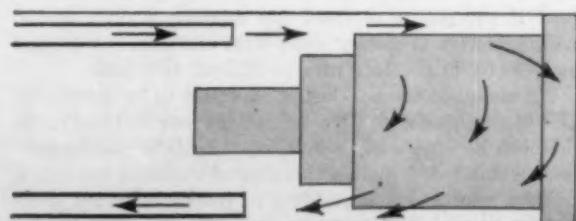
As with intaking on the wide side with brattice, exhausting through tubing tends to result in short-circuiting, with the result that there may be no air moving at all over part or all the face. Consequently, the usual practice is to blow rather than exhaust, or perhaps do both.

Blow Tubing



Ventilation with a blowing-type auxiliary fan and tubing results in much less velocity dropoff and a much better situation at the face, even with boring-type miners and the tubing discharges up to 25 to 35 ft back. Consequently, much higher gas liberations can be handled without greatly increasing total flow of air. With tubing also, it is more feasible to advance up to three or four times the distance without crosscutting or changing places. Blowing, however, tends to put more dust from ribs, floor, etc., into suspension.

Dual Tubing



Two fans and two tubing lines—one blowing and one exhausting—is another possible setup where higher gas liberations are encountered. In addition to the cost of equipment installation cost is increased, and extra space is required.

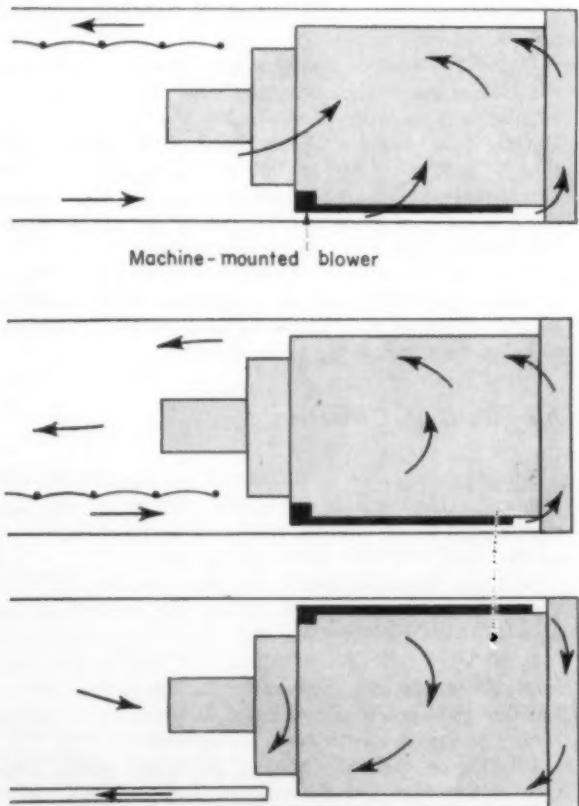
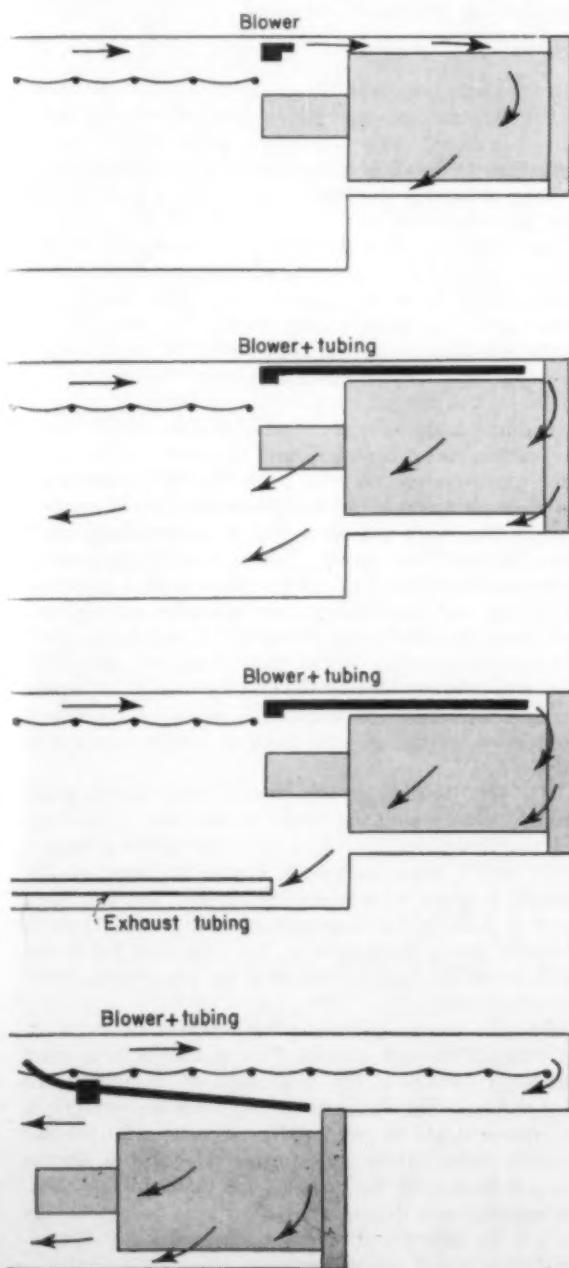
Fan and Brattice

Several arrangements are possible with brattice lines and blowers. As examples, blowers may be set at the end of an intaking line and operated with or without auxiliary exhaust tubing on the opposite side; also the

brattice line may be kept to the face and air for the auxiliary blower taken out back of the face by suction tube.

A modification of the dual-tubing system also may be employed with a brattice line. The small auxiliary booster in such a setup could be set at the head of the brattice line, with a standard exhauster and tubing on the opposite side. Good circulation can be secured at the face, but such an installation requires extra space, equipment investment and installation cost, in addition to possibly resulting in a dead-air section.

Machine-Mounted Blowers—What is considered by many to be possibly the best solution to the problem of clearing the face with a minimum of complications, particularly with boring units, is installing a small auxiliary blower, operated off the hydraulic system, directly on the miner itself. Capacity of the unit runs from approximately 600 to 1,000 cfm through a 6-in tube. As a rule, however, effective circulation is about four times blower rating as a result of the jet or injector action of the air stream.



The jet action has, however, some disadvantages. One is that it stirs up and entrains dust. The second is that it recirculates methane. The extent of recirculation depends on how far the blower operates ahead of the brattice line. This recirculation is particularly noticeable when exhausting is done behind the brattice line, but even with an intaking or blowing line the end should be kept to within 10 or 12 ft of the auxiliary blower.

Coal Age Special Report . . .

Recirculation, however, does not result in an ever-increasing methane content. Rather, a state of equilibrium is reached after certain time, with the same quantity of methane leaving through the line brattice as is made at the face. Again, however, it should be noted that even though the methane content will reach equilibrium state, the equilibrium percentage will be higher the further the brattice line is back, with consequent increase in short-circuiting.

In summary, work by the Bureau of Mines indicates that of the two possible systems of using brattice lines with a machine-mounted blower, the blowing system is much superior. In any event, sufficient intake air should be available to dilute face liberations to 0.5%.

Machine Blower and Exhaust Duct—An apparently more promising method of ventilating with the small machine-mounted blower, especially with high liberation rates, is to supplement it with an exhaust duct of noncollapsible tubing on the opposite side. The effective diffusing action of the blower is thus supplemented by the positive evacuation of the exhaust tubing.

Unless the exhaust tubing is kept abreast or ahead of the blower intake, however, the same dust and gas recirculation is encountered. And when the tube end is kept ahead of the blower it also is ahead of the operator and thus he is largely freed of dust as long as the sprays are effective. If the machine blower stops for any reason, the exhaust tube alone is likely not to provide adequate face sweeping except in slightly gassy places.

Methane stratification behind miners has been noted in some operations, and one suggestion is to mount a second jet blower with nozzle on the back of the machine to break up this layering along the roof.

Air Plus Dust Collection

Spray effectiveness is quite good on present-day machines, but dust still is a problem: (1) because of discomfort and health hazards, and (2) because of deposition on ribs, roof and floor out of the air stream.

With machine operators in the usual position and with the intake behind brattice lines—i.e., blowing toward the face—any dust goes over his station. The quantity can be reduced by installing dual controls so that he can shift from side to side with shifts in the position of the brattice. But this gives practically no relief to operators of pickup loaders or shuttle cars or both, if employed.

Intaking on the wide side, as previously noted, takes care of the dust, but the velocity drops off and makes movement of the gas even more difficult.

A new idea for solving the dust problem and also helping at the face is the use of a cylindrical suction-fan-type unit with water entrapment of the dust, which would be discharged to the machine conveyor or otherwise disposed of. Mounted ahead of the operator, and with capacities up to 10,000 cfm, such units would provide good air circulation at the face as well as dust collection, and would have the further virtue of always being in proper working position.

Foam Suppression

Establishment of a foam blanket between the head of a boring-type miner and the face is a second new idea for effective, automatic handling of the dust problem. The generator would be mounted on the miner and would feed the foam into the working zone by proper piping and distribution facilities. If the process proves practicable, it should result in practically complete dust suppression.

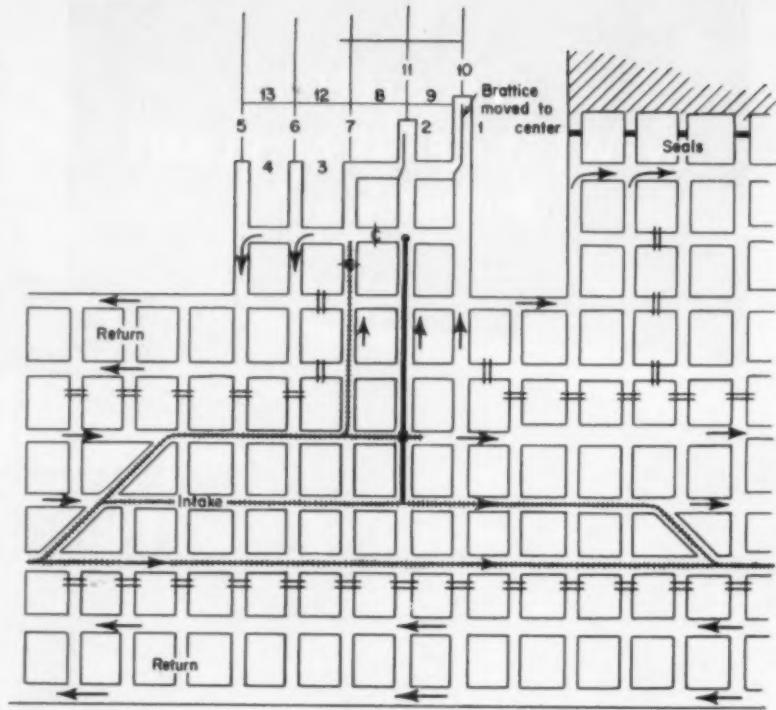
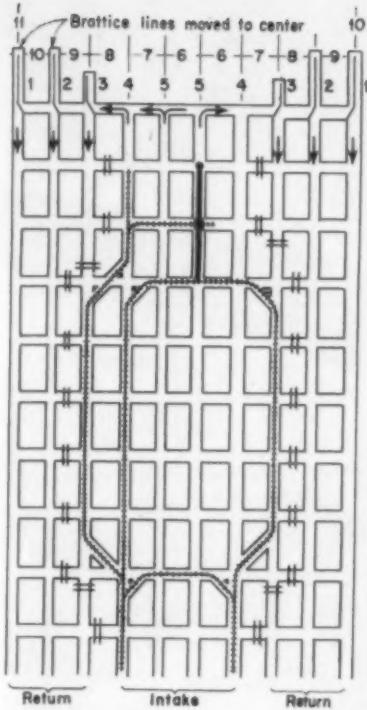
Ventilating Without Haulage Through Curtains

It obviously is a major advantage to be able to ventilate and at the same time haul with shuttle cars without going through curtains. This is possible under certain specific conditions. In heading advancement, for example, where intaking is done in the center and the air is split to each side and conducted up the wide side of the places, a system similar to that shown in the accompanying plan may be employed. A second advantage is that dust is carried away from the men in the place, but a disadvantage is the lower velocity in the face zone. Consequently, the plan so far has been limited to areas making little or no gas or mines using ripper-type machines, which do not occupy the full cross section of the opening.

It will be noted, to repeat, that wide-side coursing along the brattice lines is necessary with the intake in the center headings. Otherwise, at some point, the shuttle cars must run through curtains. At this particular operation, incidentally, the brattice is moved to the center of the place when the machines leaves. This is possible because no equipment is required to use the place until it is picked up through the next crosscut. Two machines are used and work from the sides to the center and then crosscut back. (One machine could do the same thing by alternating from side to side.) Moving the brattice lines to the center increases the area available for air travel and also prevents interruption of the air current if a brattice support is dislodged.

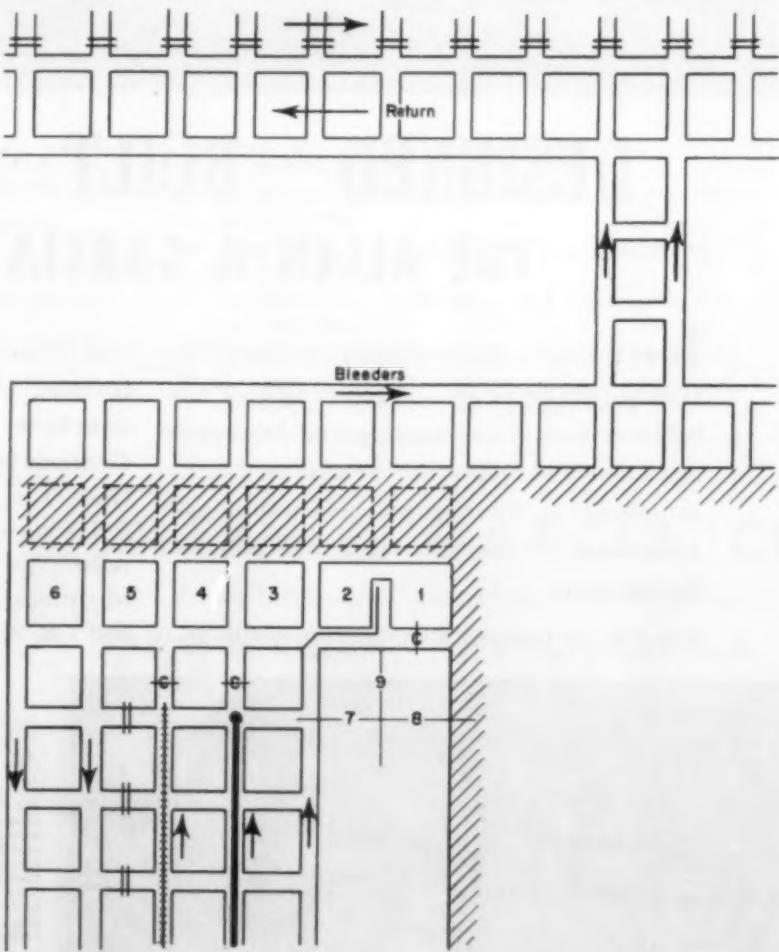
It is also possible to run shuttle cars without going through curtains with the intake on one side of the entry and the return on the other. As with splitting from a center intake, more curtains or checks are required. An example is given in a second illustration herewith. One miner is used in this five-heading setup making cuts in the order shown. Intaking is on the wide side, but it also could be on the narrow side with the same entry intake and return setup.

Flat pillar lines also make possible retreat mining without running through checks. This is shown in a third illustration, which is the final stage of mining in the five-heading panel discussed in the preceding paragraph. The system could be employed even without the bleeder openings shown, which are a further safeguard in gaseous areas—at least until the gobs get too thick. In this mine, the openings are driven well in advance to outline the panel to be mined and permit a substantial gas elimination before actual mining begins.



Three Plans—

Main-entry, panel-entry and pilaring—for ventilation without hauling through curtains, checks or doors.



U. S. STEEL'S
NEWEST CENTRAL PLANT
WELLINGTON, UTAH

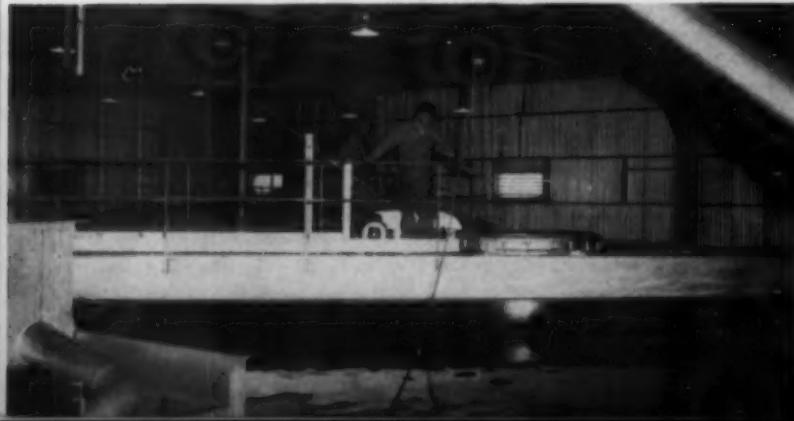


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Rated at 600 tons per hour, the new Wellington

Coal Cleaning Plant, Columbia-Geneva Steel Division, United States Steel Corporation, insures better coking coal for Geneva Works, the division's big integrated steel plant near Provo, Utah. The fact that the plant was brought to full scale operation three days after start-up reflects the soundness of design and the quality of construction you can expect from the Allen and Garcia organization.



This is a big de-silting which removes slimes from coal being cleaned for coke ovens at Geneva Works, U. S. Steel Corp., Provo, Utah. Reciprocating rakes draw coal for further washing.



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The Wellington plant takes its place in the long list of A & G success stories. Should you ever want to start with unworked earth . . . and take over a completed mine ready for profitable operation, simply put the complete responsibility in the hands of A & G. We welcome that kind of assignment.

SCOPE OF A & G SERVICES

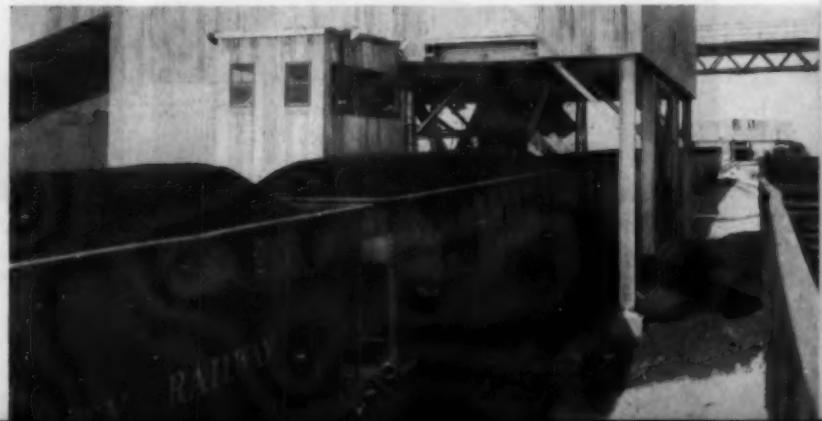
- Design and construction of new plants and their various units
- Organization, operation and management of mines
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- Below ground modernization and mechanization
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- Evaluation for financing, fire loss and taxation

Vibrating screen shakes water and sand from coarse coal. Sand suspended in water is used to float lighter coal away from heavier rock and foreign matter (ash-sulphur, etc.). Coal is then crushed prior to shipment to Geneva Works, Provo, Utah.



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A loaded railroad car every 8 minutes is the rate at which the Wellington Coal Cleaning Plant can turn out cleaned coal destined for Geneva Works.





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Continuous miner and extensible belt team up for . . .

Low-Cost Highwall Mining

by A. D. Henry

General Superintendent—Strip Mines
The Powhatan Mining Co., Bloomingdale, Ohio

OPEN PIT mining has been in progress since the turn of the century in Ohio and has progressed to a place where it now provides about two

thirds of Ohio's annual coal production. Three eastern counties, Belmont, Harrison and Jefferson, contain large acreages of Pittsburgh or No. 8 coal. Much of this vein is located near the tops of the hills and is well located for surface mining. The seam is uniform in thickness, averaging about 56 in., and dips about 25 ft per mi to the

southeast. While most of Ohio's coal production comes from the Pittsburgh vein, large quantities are also being strip-mined in other seams.

In spite of the mammoth stripping

shovels in use most companies eventually reach a height where it is not

Prepared from a paper presented at the Kentucky Mining Institute in November, 1958, and additional information and data provided by the author.



CLEAN 70-FT WORKING WIDTH is prepared to accommodate mining equipment. Power for the operation is supplied by 300-kw diesel-electric set in foreground.



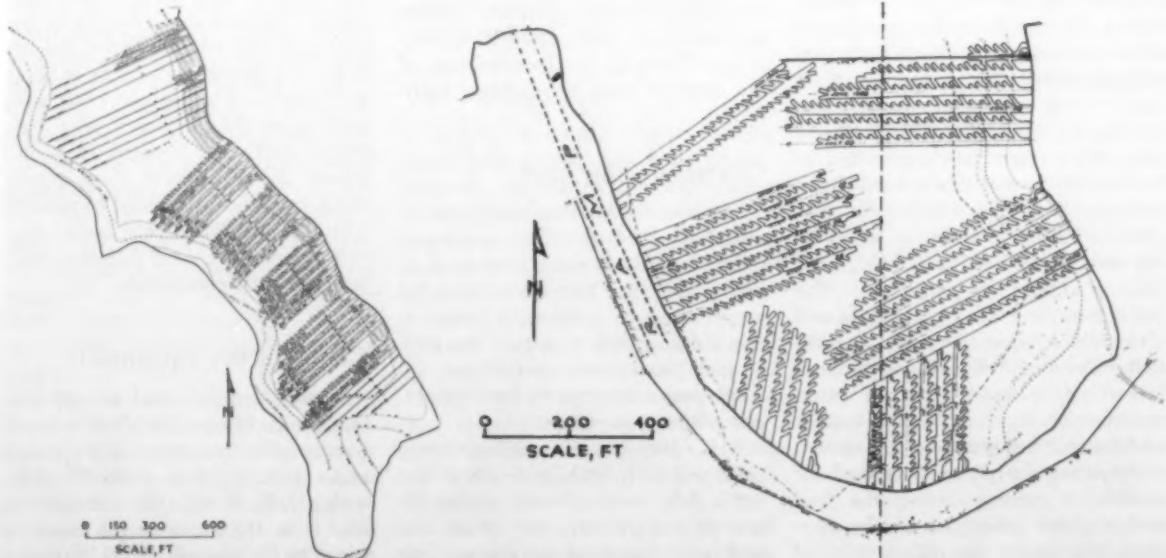
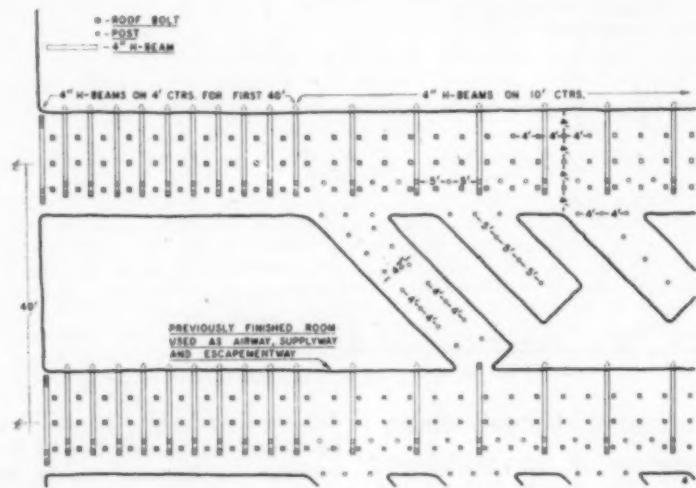
HIGHWALL MINING should closely follow stripping to take advantage of clean pit. Otherwise, extensive scaling of loose material and cleaning of slough is required.

economically possible to strip higher. As a result, tracts of coal under high cover, varying in size from a few to several hundred acres, remain unmined. Finished highwalls usually vary from 60 to 100 ft in height depending on the range and capacity of the equipment making the final cut. Much of this coal under high overburden was considered of little value until a few years ago because there was no suitable way of recovering it. In 1951 and 1952 a few companies started auger-mining some of these areas, and although low cost can be achieved it is also wasteful of the coal reserves. Once the perimeter of a block of deep coal is auger mined it is not possible to recover the remainder by any other method.

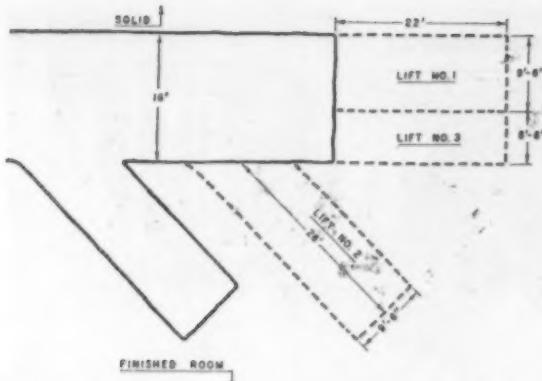
This waste and loss of deep coal reserves prompted officials of The Powhatan Mining Co. to conduct experiments with continuous mining equipment under highwalls that had been stripped to about 80 ft of cover at their Betsy Mine in Jefferson County near Bloomingdale, Ohio. This mine operates in the Pittsburgh or No. 8 coal which averages 56 in in thickness. There are about 1,000 acres of this deep coal remaining on the Betsy property. Stripping had been completed on most of it 8 to 10 yr ago and the pits contained large quantities of highwall slough and water.



ROOF SUPPORT under heavy slate requires roof bolts, 4-in H-beams and posts. The diagram below shows minimum standards of roof support plan, including additional supports near room neck to hold blast-disturbed overburden.

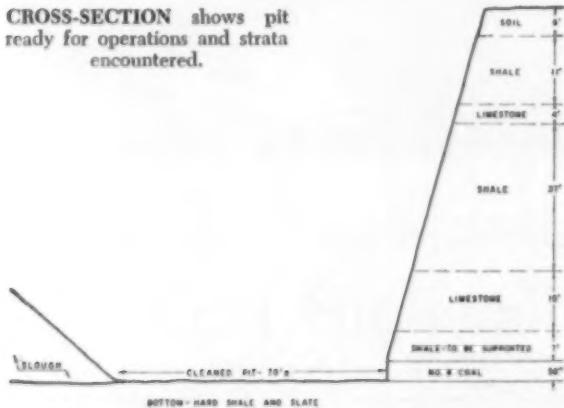


LONG, NARROW FINGERS of coal, as in Pit No. 4 at left above, can be fully recovered by operations from one side. Wider areas, as in Pit No. 5 at right, are mined from all sides to insure maximum possible recovery of solid reserves.



MAXIMUM RECOVERY is requirement which calls for driving 26-ft-long lifts into rib toward previously completed room.

CROSS-SECTION shows pit ready for operations and strata encountered.



Experimental Highwall Mining

Preparation of pits for highwall mining after stripping has been finished for a number of years is a difficult task. Drains had to be opened with bulldozers and a 3½-cu yd diesel shovel so that pits were relatively free of high water. The shovel was then put to work casting the slough from the toe to the highwall to the spoil side. More often than not it had to be handled several times. A bulldozer performed the final clean-up and every effort was made to have the cleaned pit about 70 ft wide when finished and as dry as possible. The pit bottom is a hard gray shale and slate which usually makes a satisfactory haul road. Even small accumulations of water in the pit prove troublesome, especially in cold weather and intermittent pumping is required.

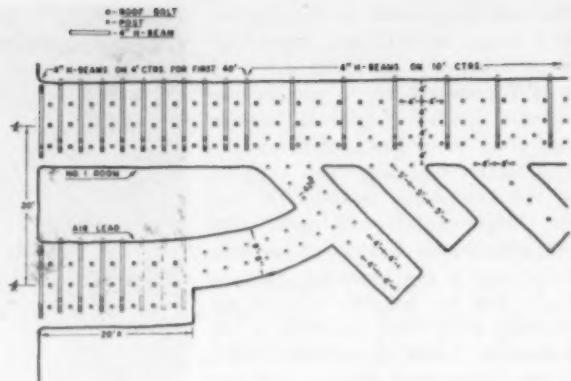
Preparing the pit and highwall for continuous mining during the final stripping and mining cut can be done with practically no added cost. If possible the highwall should be drilled and shot vertically so as to eliminate

dangerous overhangs. The wall should be sloped and scaled free of loose material. Pit bottoms can be bulldozed free of pit cleanings and drains left open. It is desirable to have the continuous-mining operation follow the final strip coal loading as closely as possible so as to take advantage of the clean pit and unweathered highwall.

Controlling the Roof

The roof in the Pittsburgh seam is notoriously bad and the experiments referred to above were conducted in the summer of 1955 to determine the proper type of continuous miner to use and how best to control the roof. A small pit area was cleaned out and rooms were driven with both ripper and boring-type miners.

The boring-type machine was equipped with hitch-hole cutters that cut a 6-in swath directly under the roof to a depth of about 18 in. The roof was supported by placing one end of a 4x4-in by 15 ft 8 in H-beam in this opening and supporting the



AIR LEAD to first room of new panel establishes ventilation circuit. Following rooms are connected through breakthroughs.

other end with a post and wedge cap. This type miner would advance a 9 ft 6 in cut 20 ft deep, back up and take an additional 8 ft 6 in at which time the H-beams were set on 4-ft centers. During the experiment some of the roof was left unsupported and did not stand for any appreciable time. Another area was roof bolted with various lengths of bolts. Satisfactory torque was not obtained until a 96-in bolt was anchored in what is locally called the bastard limestone. It was considered necessary to develop the 16-ft room in order to maneuver this type miner in and out of side cuts and breakthroughs. The boring type miner produced 3.24 tpm of operation in this test when coal was conveyed with an extensible belt. Under similar conditions the ripper-type machine put out 1.12 tpm. Roof action indicated that blasting in the final stripping cut weakened the top in varying degrees to a depth of about 40 ft. Extra H-beams and posts were used under this disturbed area. Few serious roof falls resulted from this source. As a result of these experiments our officials decided to proceed with the installation of a boring-type continuous miner along with the necessary auxiliary equipment.

Choosing the Equipment

As with any new and untried venture the problem of building and perfecting the complete unit was a major task. A 30-in extensible belt, with 1,000 ft of belt conveys the coal from the miner to the elevating conveyor in the pit. A 20-ft. bridge conveyor attached to the extensible belt tailpiece gives the miner enough

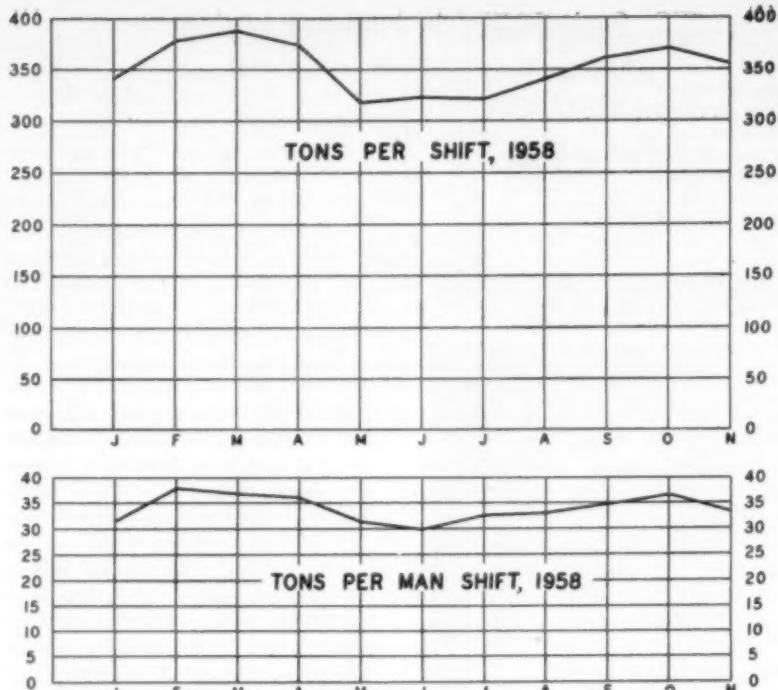
flexibility to cut breakthroughs and make rib cuts. A portable elevating conveyor, which was designed and built in our own shop, conveys the coal from the belt head to the coal haulers. A heavily reinforced arched-steel canopy is placed next to the highwall at the pit mouth to deflect any falling rock or debris from men and equipment. Lack of purchased-power facilities necessitated the use of a trailer-mounted, diesel-powered 300 kw DC generator plant. Additional items are:

- 1 Small roof bolting drill,
- 2 Shuttle cars,
- 1 Set power cables and distribution house,
- 1 Portable mine fan,
- 1 High pressure pump and water system,
- 1 Tank truck for water haulage,
- 1 Combination foreman's office, lamp and rest house,
- 1 Supply house,
- 200 4x4 in by 15-ft 6-in steel H-beams.

It should be remembered that all of this equipment must be kept portable and is either mounted on rubber-tired trailers or steel sleds. A bulldozer is used for moving and positioning it in the pit.

Much of this equipment was built and assembled in our own shop, some of it came from other of our company's underground mines. However, the continuous miner and extensible belt were bought new. Cost of the miner was about \$100,000, the extensible belt was \$85,000 and remaining items amounted to approximately \$65,000, thereby providing sufficient equipment to load coal into transportation facilities for a total of \$250,000. Had all of the equipment been purchased new the cost would total at least \$300,000. Our company is mining this deep coal and combining it with their strip coal production and did not have to buy extra haulage units nor tippling facilities. We use three 35-ton tractor-trailer units and two drivers to haul the coal a distance of 4 mi.

Sufficient coal reserves should be provided to depreciate the greater share of this type capital investment of \$250,000 over a period of about 8 yr. To maintain a well balanced two-shift operation the unit should produce approximately 12,500 tons per month or 150,000 tons per year. On this basis reserves of about 1,200,-



PRODUCTIVITY for the period from Jan. 1 through Nov. 30, 1958 reflects a high level of efficiency. Numbers of shifts worked are revised upward in both charts to include overtime. In the lower chart, tons per man shift are calculated on the basis of a crew of 9½ men, as follows. One foreman; two mechanics (includes two on third shift); one continuous-mining-machine operator; one operator for the tail section of the extensible belt; two bolting machine operators; one post-setter; half the time of a supplyman (works day shift only), and one recovery man (two recoverymen work together on one shift only). Coal is recovered on two shifts; the third shift is for maintenance.

000 tons would provide an 8-yr depreciation schedule of 21c per ton. Replacement of some of these items can be expensed as they wear out.

The Mining Plan

A detailed mining plan of the pit area, room panels and room projections is provided by our engineering department. The combination roof-bolting pattern and roof-support plan now in use is the one best suited to our conditions. The engineers set and advance sights as rooms advance, measure all projections and record tonnage mined. The mine map of our No. 4 pit represents a typical area and shows the six-room panels separated by 100-ft blocks of solid coal, all of which is required by a license issued by the State of Ohio's Div. of Mines. All of this mapping and field work requires about 2 hr of the engineering corps' time each day.

The entire operation is conducted

in strict compliance with licenses issued by the Ohio Div. of Mines and under the supervision of the U. S. Bureau of Mines. We have enjoyed the utmost in courtesy and cooperation from all personnel connected with both of these agencies. Our highwall mining project was the first attempt at this type of operation in Ohio and offered a real challenge to all persons connected with it. Many changes have been made since the start in January, 1956, and it has required a year and a half of constant changes and improvements to reach the present high rate of efficiency and production.

Locating and positioning of equipment in the pit area is largely controlled by the pit width provided. As stated previously, wide, dry pits are desirable but not always available by any means. Movement of trucks and equipment and water seepage from the highwalls and spoil banks keep the working place area muddy most of the time, in spite of good drains

Performance in Highwall Mining

	1956	1957	1958 (11 Mo)
Tons produced.....	89,581	140,657	128,650
Tons per shift.....	207.1	300.0	353.2
Tons per man shift.....	21.1	29.5	34.02
Tons per foot of advance, wide work.....	4.20	4.82	4.58
Average depth of rooms, ft.....	338	400	471
Acres mined.....	21.07	26.63	25.77
Recovery per acre, tons.....	4,249	5,282	4,989
Face cost per ton, labor only.....	\$1.169	\$0.922	\$0.703
Bit cost per ton.....	\$0.076	\$0.056	\$0.047
102-in roof bolts set per shift.....	38	43	51.7
Posts set per shift.....	43	42	48.9
Total roof bolts recovered.....	1,672	6,466	4,999

and frequent pumping. The foreman's office, supply house, spare canopy, shuttle cars, spare belting, etc., are placed out of the way of the trucks, yet handy for use. The generator plant, power-cable distribution house, high-pressure water pump and tank are kept within 100 ft of the active room but on the opposite side of the area occupied and used by the trucks and elevating conveyor.

Necking the Rooms

Before No. 1 room of a panel is started an air lead is driven in, usually to a depth of 30 to 40 ft on 30-ft centers with the centerline of the new room. The lead is driven straight in full width for about 20 ft then angled to the left with a single lift to a point that will intersect the projected room about 35 to 40 ft in from the face of the highwall. The purpose of this air lead is to provide a place to set the portable fan and provide air in the regular room, thereby extending the depth slightly to which it can be driven and still comply with the law pertaining to air.

When the miner necks a room, the extensible belt is not set up until the room has been advanced and widened under the highwall a distance of about 30 ft. During this time it loads directly onto the elevating conveyor or into shuttle cars if pit room is too limited. Once the miner has made its initial 9½-ft cut on the left side to a depth of 20 or 25 ft, it backs out and moves over preparatory to making the widening lift of 6½ ft. As the miner moves out, the roof bolters move in and set a pattern of 96-in roof bolts on 4-ft centers. As the widening cut progresses the top is caught as soon as possible. This is done by setting steel H-Beams on about 2- to 4-ft centers, one end in the left hand rib hitch

hole cut by the miner and the other end on posts. It is seldom necessary to set H-Beams on these close centers to a depth greater than 30 or 40 ft. While the miner drives the widening cut up even with the initial cut the roof bolters will have finished bolting and have moved out. The miner then can drive another 20-ft in the left side after having set up the extensible belt between it and the elevating conveyor. At the same time the timberman and bolters are working in the widening cut. Once the room is necked full width beyond the tender roof area to a point beyond the air lead, the fan can be set. The extensible belt and canopy are in place and the roof is well supported.

After the air-lead and No. 1 room of a panel have been driven up, each succeeding room is necked as previously described. As this room is driven up every third rib-cut is holed into the previously finished room which serves as an airway, supplyway and escapeway. No timbers or roof bolts are removed from any room as long as it is used as an escapeway.

Three-Stage Room Mining

Creating and maintaining the three-stage mining cycle contributes greatly to high production and varies somewhat from the necking-in process just described. The miner is advanced about 22 ft on the left side. During this time the bolter is setting one row of bolts in the previous widening lift No. 3 in the neck. The miner is then retracted and the bolting machine moves into lift No. 1, the miner then advancing into the right-hand pillar for a distance of 26 ft, making lift No. 2. It is then retracted and advances the right side of the room (lift No. 3). While this is being done the timbermen set posts in lift

No. 2. Upon completion of lift No. 3 the miner is maneuvered to the left side of the room and the mining cycle is started once more.

The law limits the depth of a room to 100 ft beyond air and an escapeway, about four rib cuts, could be made after passing the air lead before cutting a breakthrough. However, we normally hole through every third rib cut which provides an airway and escapeway about every 60 ft. Plans have been made and additional equipment purchased at our Betsy operation to work two complete units in parallel. While we are not yet operating these two units simultaneously we have gained greatly in operating efficiency of the one working unit as a result of having the other as standby equipment. By having a second continuous miner we can drive the first and second rooms of a panel up alternately and thereby gain the maximum depth of both rooms and still maintain an escapeway. During 1957, 73 rooms were mined and averaged 400 ft in depth, the deepest room being 714 ft.

A few improvements have been effected during 1958 that have reflected better production and cost. We now use both units intermittently when starting a new panel of rooms which permits driving the first two rooms to maximum depth and still maintain sufficient air and an escapeway. Experiments are being conducted with a more efficient roof drill. Additional tonnage can be mined if we can set about 70 roof bolts per shift. This appears to be the only remaining bottleneck.

Our 1958 tonnage is slightly less than 1957 because of market conditions. Efficiency of this operation is reflected in the increase shown in tons produced per shift, tons per man-shift and lower face cost.

Production Crews

We produce coal on the daylight and afternoon shifts, the third shift is used for maintenance. Each of the production crews alternate shifts weekly and consist of the following personnel:

- 1 certified mine foreman,
- 1 continuous miner operator,
- 1 tailpiece operator,
- 2 roof bolters,
- 1 timberman,
- 1 mechanic.

A utility man keeps posts, roof bolts and supplies handy to the room neck, fuels the generator engines and keeps water on hand for the high-pressure pump. Two recovery men work the daylight shift. All H-beams and about 50% of all roof bolts are recovered. Handling of these materials is done with a shuttle car. Two mechanics grease and maintain the equipment on the midnight shift. Total personnel, including the two foremen add up to nineteen men.

Operating Experience

A brief review of our experience reveals many changes in the use of equipment, radical changes in design of certain components of the unit and alteration of the mining plan. During the first year of operation there were prolonged periods of time when the success of the venture was very much in doubt. The first coal was mined on Jan. 30, 1956 under very adverse conditions. Experienced underground miners and equipment were exposed to very cold weather which resulted in a large labor turn-over, frequent breakdowns and poor overall efficiency. Some improvement was noted during warm weather but as a whole we had not convinced the principals of our company of the success of the venture by any means at the end of the year.

During 1957 many improvements were made. Crews were better organized and only the best men were retained. Local management designed and built the present elevating conveyor which contained a large power-driven belt reel. Use of the belt reel permits parting the belt at the tail-piece of the extensible belt when a room is completed and winding it all up in a few minutes instead of taking it off 100 ft at a time at the belt head. This permits extracting

the fabrication and miner in short order. This item alone has increased shift production by at least 75 tons. Use of a small, highly portable roof-bolting machine and good men to operate it is another most important item. Having standby equipment, especially the spare continuous miner, which is subjected to hard and continuous service, has increased our efficiency greatly. All of these changes and improvements have resulted in a low cost operation as shown by the performance data in the accompanying table. At present we are producing at an average of 360 tons per 8-hr shift, with a face labor cost of 70c per ton, 31 tons per man shift and a 5.5c bit cost.

We hope to increase our present rate of production to 400 tons per shift and believe we can attain this goal with improved roof bolting.

A study was conducted several months ago relative to the application of an underground auger, which would work in conjunction with the Colmol units. Room centers of 40 ft would be maintained in the first two rooms in a panel with the Colmol. Then a 145-ft block would be left before driving the next two rooms. This block would be augered, 85 ft from one side and about 60 ft from the other. We intend using a 42-in auger for this work. While recovery per acre would not increase, the cost savings would be very significant. Auger coal would be conveyed outside on one of our extensible belts. Three men would be added for the auger crew but no additional supervisory help would be required. No extra power or pit cleaning would be needed. We estimated shift production for this unit conservatively at 300 tons. Capital outlay would not exceed \$100,000. We hope to make this installation whenever our market demands the additional tonnage.

Coming in April . . .

A preview of the 1959 American Mining Congress Coal Show will be a major feature of the April issue of *Coal Age*. Included in this special feature will be a roundup of new equipment to be shown at Cleveland, May 11-14, and the complete program of the technical sessions. Of added interest to our readers, we think, will be helpful hints on how to get the greatest value from your trip to the Coal Show.

Your primary purpose in going to Cleveland will be to get ideas that will pay dividends at your pace of work. We can help you budget your time to achieve this purpose. The April issue will tell you how.

By the way, the March issue will carry an article on wireless control of 33,000-V power through the use of a two-way radio system.

**The RIGHT Answer
to Your BULK
STORAGE Needs:**

**MARIETTA
CONCRETE
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Coal storing and handling becomes simplified, efficient and economical when you have a MARIETTA storage system engineered to your operation.

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Now on stream at
INLAND STEEL...

another
DORRCO
FLUOSOLIDS
COAL DRYING
SYSTEM

Another large Dorco FluoSolids coal drying system was recently put in operation at the Inland Steel Company's new coal drying plant at Price, Kentucky.

Currently, the system is removing 22.0 tons of water per hour from a wet feed of 180 tons per hour of $\frac{5}{8}$ " x 0 metallurgical coal.

These statistics, however, show only a partial story, for FluoSolids coal drying, when compared with conventional thermal drying techniques, is proving commercially to provide higher efficiency, higher capacity, closer operating control with lower maintenance.

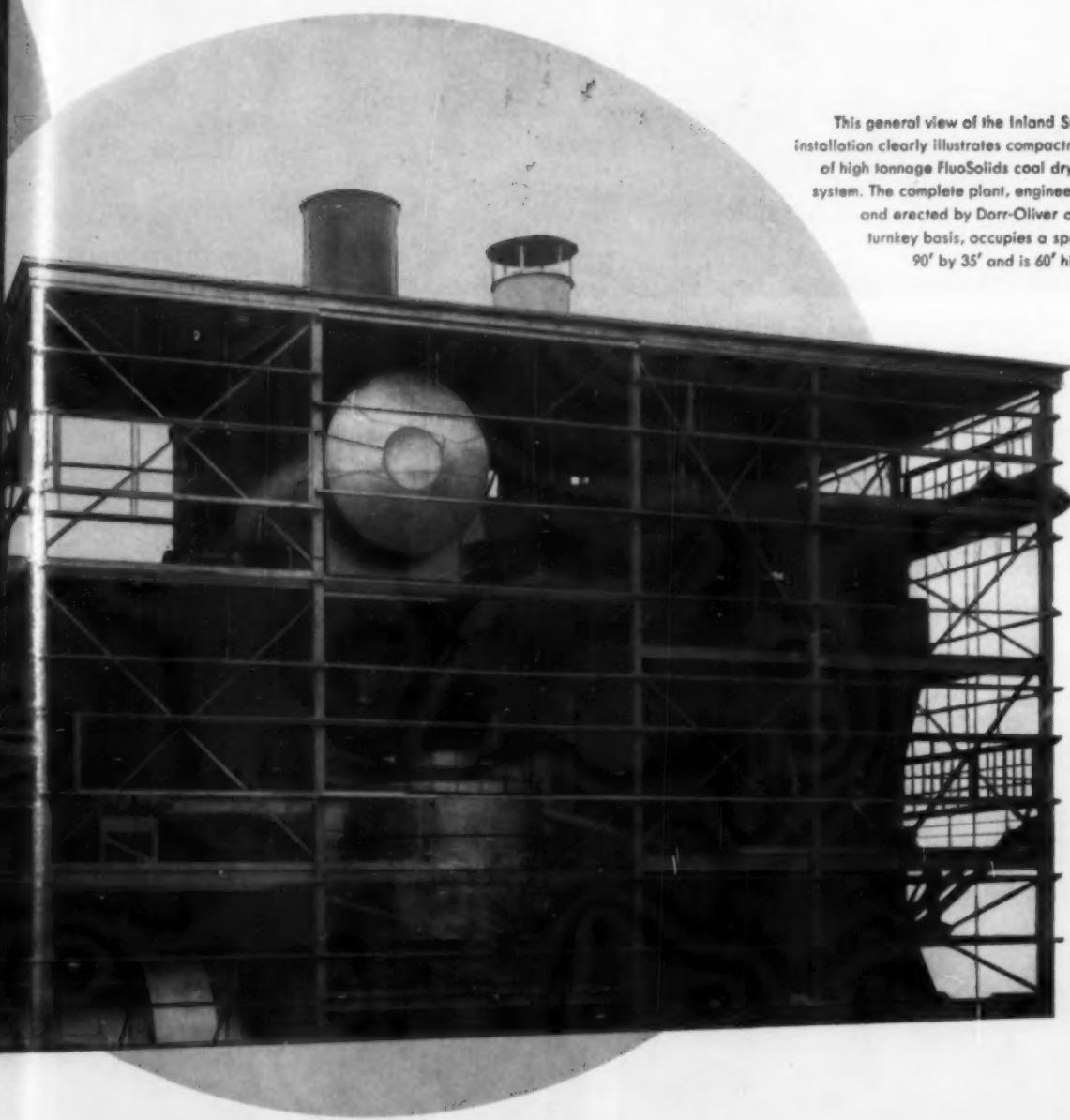
Operating data substantiating these facts are available. For the complete Dorco FluoSolids coal drying story . . . and more significantly how application of the system can benefit your plant operation, write to Dorr-Oliver Incorporated, Stamford, Connecticut.

What is the FluoSolids System?

A VALUABLE TOOL FOR DRYING, SIZING AND HEAT TREATMENT

When particles are suspended in an upwardly moving stream of gas, the entire dense mass behaves much like a liquid and is said to be fluidized. Applied to coal drying by the Dorco FluoSolids system, fluidization results in a new and better drying technique, in which the efficient mixing action of the fluidized bed instantaneously transfers the heat from preheated air to the wet coal. A combination of reactor, blower, cyclones and other auxiliary equipment forms a complete processing system, adaptable to a wide range of drying, sizing, roasting and heat treatment applications.

HELP FOR YOUR PROBLEM: The science of fluidized coal drying was pioneered by Dorr-Oliver. The benefits of this vast experience can be profitably applied in your plant. If you will send us a brief outline of your problem, we will be glad to have an engineer call at your plant for further discussion.

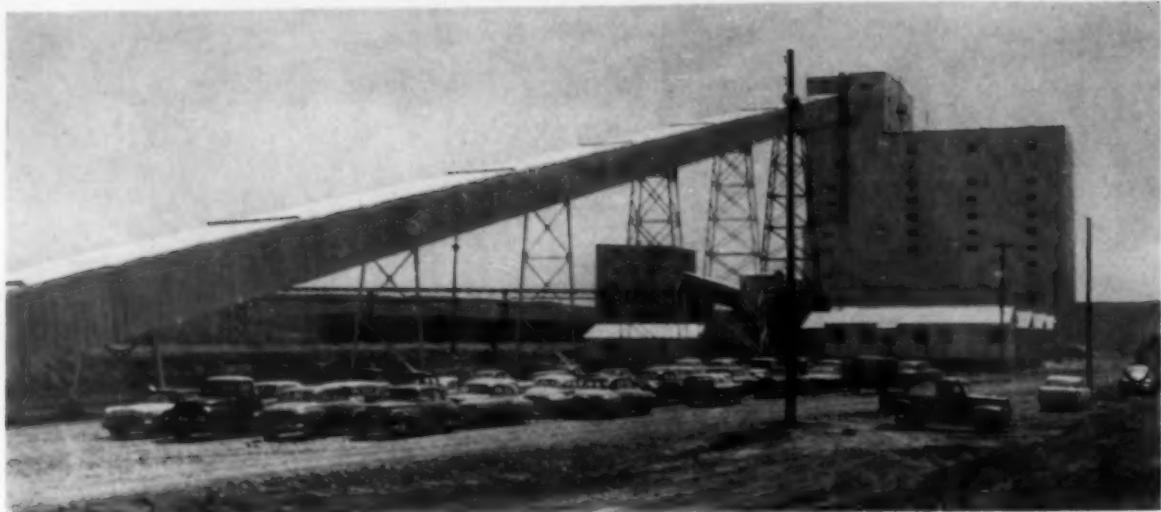


This general view of the Inland Steel installation clearly illustrates compactness of high tonnage FluoSolids coal drying system. The complete plant, engineered and erected by Dorr-Oliver on a turnkey basis, occupies a space 90' by 35' and is 60' high.



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NEW PREPARATION PLANT is another step in U. S. Steel's continuing effort to reduce costs and improve performance at its facilities. The 600-tph plant processes coking coal for the blast furnaces of the company's Geneva Works.

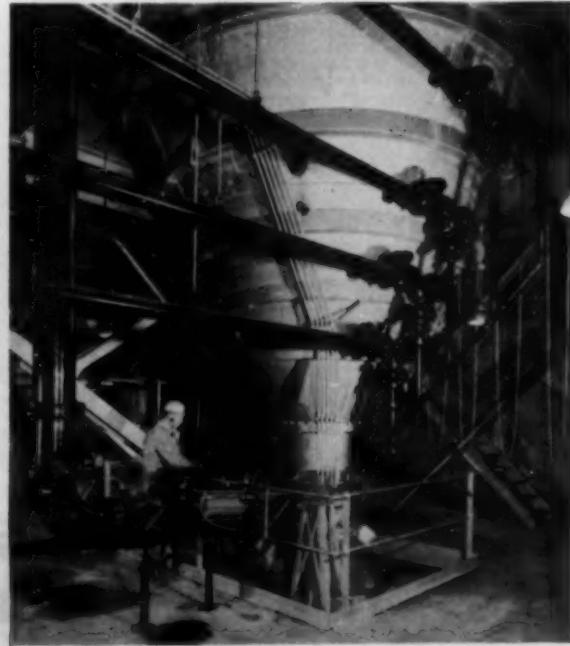
Improving Coking Coal Quality

Increased strength and yield of coke and an ensuing boost in blast-furnace output result from upgrading blend of three high volatile coals in new 600-tph cleaning-in-transit preparation plant.

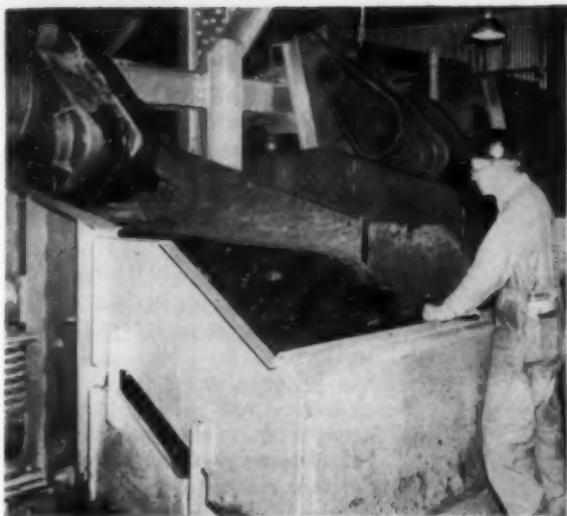
by R. M. von Storch
General Superintendent
Coal Mines and Quarries
Columbia-Geneva Steel Div.
United States Steel Corp.
Dragerton, Utah



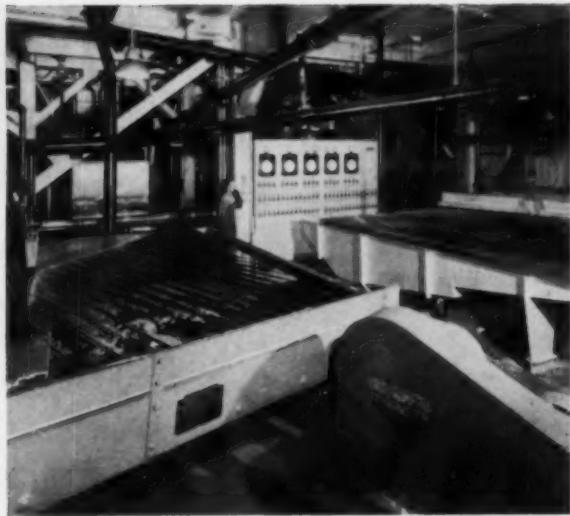
ELECTRONIC WEIGHING and proportioning device controls raw-coal feed from three 600-ton storage bins.



COARSE COAL is washed in sand-flotation cone. Refuse is desanded and dewatered on vibrating screen, then crushed.



DEWATERING and desanding of clean coarse coal is assigned to vibrating screens. Coal then is crushed for shipment.



FINE COAL is processed by 18 wet tables fed by two nine-way distributors delivering equal volumes to each.

UNITED STATES STEEL's new coal cleaning plant at Wellington, Utah, represents another step in the Corporation's continuing effort to reduce costs and improve performance at its facilities. Completed in March, 1958, for the Columbia-Geneva Steel Div., the 600-tph facility is now processing coking coal destined for the blast furnaces at Geneva Works.

Utah's high-volatile coal deposits, while vast, are of marginal coking quality. To improve its metallurgical characteristics, the high volatile coal is blended with medium and low volatile coals from Colorado, Oklahoma, and Arkansas at Geneva Works. To further improve the coking qualities of the high-volatile coal, it was deemed necessary to blend the three high-volatile coals from the Columbia, Geneva and Somerset mines and then to wash this blend prior to delivery at Geneva Works.

Testing the Coal

Long before the cleaning plant was designed, samples of coal from the Columbia, Geneva, and Somerset mines were subjected to a series of washability tests to determine the washing characteristics of the coal. Washed portions of the coal were then coked to learn what effect washing at various gravities had on the resultant coke. The results of these

two series of tests, washability and coking, were then evaluated so that a plant could be designed for the best utilization of raw-coal reserves.

A full-scale test on coal from the mines was conducted at U. S. Steel's coal washing plant at Corbin, Ky. Eleven carloads of coal were shipped from Utah to Corbin where they were washed, and returned to Geneva Works for coking. The results of the full-scale test confirmed the washability tests and showed that a flowsheet similar to the Corbin Plant (*Coal Age*, September, 1956, p 79) would be suitable for this job.

After investigating various locations, a site was selected at Wellington, Utah, which met necessary requirements as to waste disposal, railroad transportation, power, personnel and water.

The Wellington coal preparation plant is located about 1 mi southwest of Wellington, Utah, along the main line of the Denver and Rio Grande Western R.R. The new facility processes coal from United States Steel's Columbia and Geneva Mines at Dragerton, Utah, and from the Somerset Mine at Somerset, Colorado. Coal from these three mines is the total high-volatile coal used in the coke plant blend at Geneva Works. Primary purpose of washing the high-volatile coal is to increase the strength and yield of coke, thereby increasing the amount of hot metal produced in the blast furnace per ton of coke used. When run-of-mine coal is washed, its ash and sul-

fur content is reduced, resulting in increased coke strength and yield from the coal.

During the actual construction of the plant, over 600,000 cu yd of earth were moved, 6,000 cu yd of concrete were poured, and 2,000 tons of steel were erected. The size of the plant is indicated somewhat by the amount of connected load—4,500 kw.

Raw coal from Columbia, Geneva and Somerset Mines is crushed to minus 5 in at the mines and loaded in railroad cars for shipment to the cleaning plant.

Inbound coal is spotted, by mine, on two of six tracks designated for that mine in the raw coal yard. All told, there are approximately 10 mi of railroad track on the cleaning plant property. A diesel switch engine moves the loaded cars to the track hopper building, placing the cars over the proper bin for that coal.

The doors of the car are opened manually and shake-out units unload the cars into one of the three 600-ton bins installed below track level. The switch engine then moves the empty cars either to the loading station for reloading with clean coal, or over a by-pass track to the outbound yard for return empty to the mines.

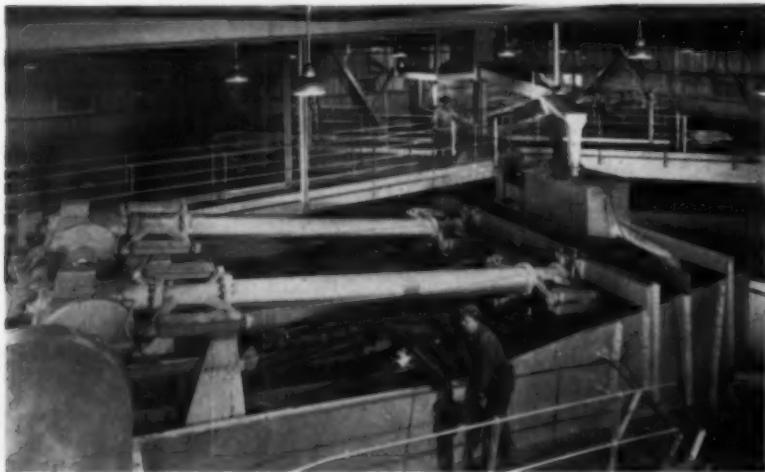
Electronic Weighing and Proportioning

Twin vibrating feeders at the bottom of each bin feed the 5x0 coal

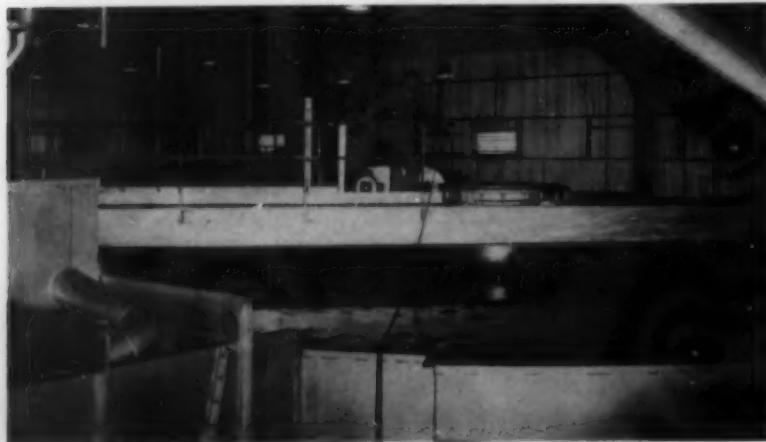
Adapted from a paper delivered at the regional meeting of the AISI, San Francisco, Calif.



CENTRIFUGAL FILTERS dewater clean $\frac{1}{4} \times 0$ coal from the tables. Effluent is recirculated to the washing circuit and coal is mixed with clean coarse coal.



RAKE CLASSIFIERS separate fine coal from slimes and refuse taken from one of two bowl desilters. Coal then travels to pair of distributors feeding tables.



BOWL DESILTORS, 44 ft in diameter, have revolving rakes on which plows are mounted to move settled material outward from the center of the bowl.

onto three 42 in conveyor belts. The rate of feed from each bin is controlled by an electronic weighing proportioning device. A predetermined volume of each coal is fed from the three 600-ton bins. The three 42-in belts dump onto a 48-in raw-coal belt. The raw coal then is carried under an electromagnet to remove tramp iron, and dumped onto the 42-in plant-feed belt conveyor which carries the raw coal to the top of the 130-ft-high plant building.

A system of three diverter chutes spreads the coal evenly into four 50-ton bins equipped with level indicators. Remote indicating devices at the plant control panel show the coal level in each bin.

Coal is removed from the four bins by vibrating feeders, insuring a continuous supply of coal to the cleaning system.

Water is added to the coal at this point in its trip through the cleaning operation. The coal and water pass over four screens which split the feed into two sizes: One, the $5 \times \frac{1}{4}$, and the other, $\frac{1}{4} \times 0$. The $\frac{1}{4} \times 0$ products, plus most of the water, flows by gravity to the fine coal sump. The $5 \times \frac{1}{4}$ raw coal is collected by a 42-in belt conveyor and transferred to the Chance cone.

The plant involves two separate operations—one for coarse coal and one for fine. At this point the coarse and fine coal go separate ways.

Coarse-Coal Cleaning

The Chance sand cone process employs the dense-media principle in the separation of coarse coal from refuse. Water, with sand in suspension, forms a dense liquid of a specific gravity to cause the coal to float and allow the refuse to sink. The refuse settles to the bottom of the cone where it is trapped off through the refuse chamber. The refuse with some sand and water crosses a vibrating screen for desanding and dewatering.

The sand and water are then pumped to the main sand sump in the Chance cone circuit. Refuse from the screen falls by gravity into a double roll crusher and is reduced to minus 2-in. The refuse then goes from the crusher to the main refuse sump. The 2×0 refuse, together with about 4,000 gpm of water, is sent by two centrifugal pumps, connected in

series, 3,200 ft to the refuse pond. It is worth noting that wherever possible in the plant, spare pumps are connected ready to be placed in operation. This reduces maintenance cost and down time by permitting operating personnel to perform routine maintenance during non-productive periods.

Pumping Refuse

Two 10-in pipelines, one of which is a spare, mounted on a structural steel bridge, carry refuse and water from the plant over the D&RG tracks to a 60-acre pond, one of two built for the plant water supply. Refuse settles out of the water in the first pond. The water then overflows into the second pond, and from there it flows by gravity or is pumped back.

The small amount of water lost by evaporation or by clinging to the cleaned coal is made up from a deep well on the property. Water can also be drawn from the Price River, if necessary. However, because the plant is designed to conserve as much water as possible, it is not anticipated using river water on a regular basis.

The float, or clean coal, from the Chance cone flows over three vibrating screens for desanding and dewatering. The dewatered and desanded coal falls by gravity into a ring-type crusher where it is crushed to $1\frac{1}{2} \times 0$ and loaded on a 42-in clean-coal belt. Clean coal $1\frac{1}{2} \times \frac{3}{8}$ already of the appropriate size, is loaded directly on the clean coal belt.

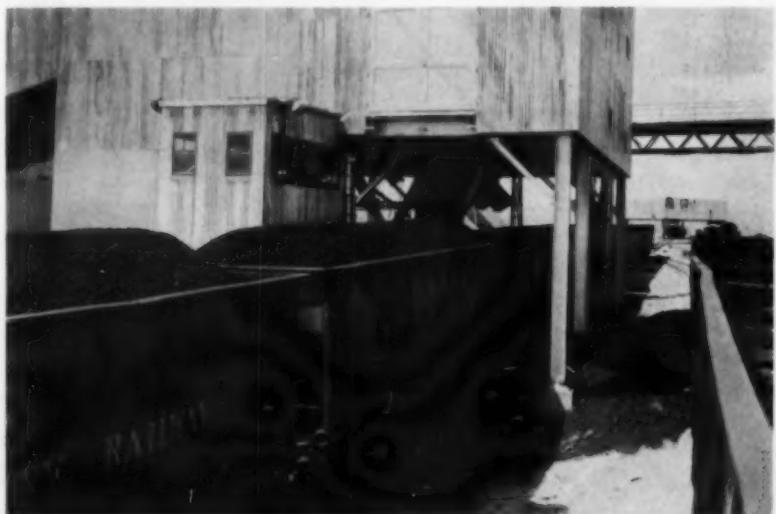
An important feature of the Chance cone circuit is continuous desilting of fine coal from the sand. Slurry from the clean coal desanding screens, containing silt or fine coal, flows by gravity to a radial screen. In the sluice ahead of the radial screen a stationary wedge-wire screen removes some of the sand and water, while the remainder flows on to the radial screen. The flow of slurry is evenly distributed around the screen by four water pressure driven rotating arms. The slurry flows across wedge-wire screens, being washed continuously by fresh water sprays. The oversize, or silt, flows into the silt sump, while the recovered sand and water are returned to the sand circuit of the Chance cone.

Fine-Coal Cleaning

The fine coal, which was previously separated from the coarse coal



REFUSE from plant is pumped $\frac{2}{3}$ mi through one of two 10-in pipes to the plant's settling pond. Lines are supported by trestle for half of distance.



EVERY 8 MIN a 76-ton car of clean coal can be filled when plant is operating at peak capacity. Two retarders are used to position cars under chute during loading.

before cleaning, plus the silt removed from the coarse coal circuit, are collected in a fine coal sump. The fine coal is pumped to the top of the plant and divided between two bowl desiltors.

These two units are 44 ft in diameter with revolving rakes on which plows are mounted so as to move the settled material outward from the center of the bowl. A segment of the tank bottom and side is cut out for the rake classifier. Feed slurry is distributed evenly through four pipes in the rake compartments. The coarse solids settle in the rake compartment while the balance, including slimes, flow back into the bowl. Here addi-

tional settling takes place while the slimes overflow the bowl and go to refuse. This slime overflow is piped to the refuse side of the Deister tables and thence to the plant's refuse sump.

The de-slimed and dewatered product from each bowl desiltor is mixed with clean water and flows by gravity to two nine-way distributors that feed an equal amount of fine coal and refuse to 18 Deister tables. Dirty water from the desiltor overflow carries the table refuse to the refuse sump where it joins the Chance cone refuse and is pumped to the disposal area.

From the 18 tables, the clean coal

Resistor life depends on adequate ventilation...

Patented **P-G** Grid
Design assures
maximum ventilation

Designed to fit
your present
resistor space

Resistor life depends on adequate ventilation and how efficiently heat may be dissipated . . . P-G grid design equalizes the amount of air space surrounding each leg or loop to obtain even heat throughout the grid area. (Note illustration.) . . . Since heat is rapidly and evenly dissipated, hot spots fail to develop and longer resistor life is assured . . . For a nonbreakable resistor (only steel and mica used) specify P-G on your next application.

The Nonbreakable Steel Grid Resistor



THE POST-GLOVER ELECTRIC COMPANY
OFFICE and FACTORY—Kenton Lands Road, Erlanger, Kentucky
MAILING ADDRESS—Box 709, Covington, Kentucky

flows by gravity to a five-way distributor where the slurry is distributed to five solid-bowl centrifugal filters for dewatering. Effluent from the filters is returned to the raw coal screens as part of the screening water. The clean dewatered fine coal is delivered by a flight conveyor to the 42-in clean-coal belt where it joins the cleaned coarse coal.

The cleaned coal is weighed, automatically sampled, and mixed before delivery to the railroad cars.

Coking Tests

The samples of washed coal, as well as corresponding samples of raw coal from various mining districts, are checked with a 30-lb test coke oven in a carbonization laboratory located at the Geneva Mine. The recently constructed facility is equipped with modern pulverizing, blending, coking and coke testing equipment.

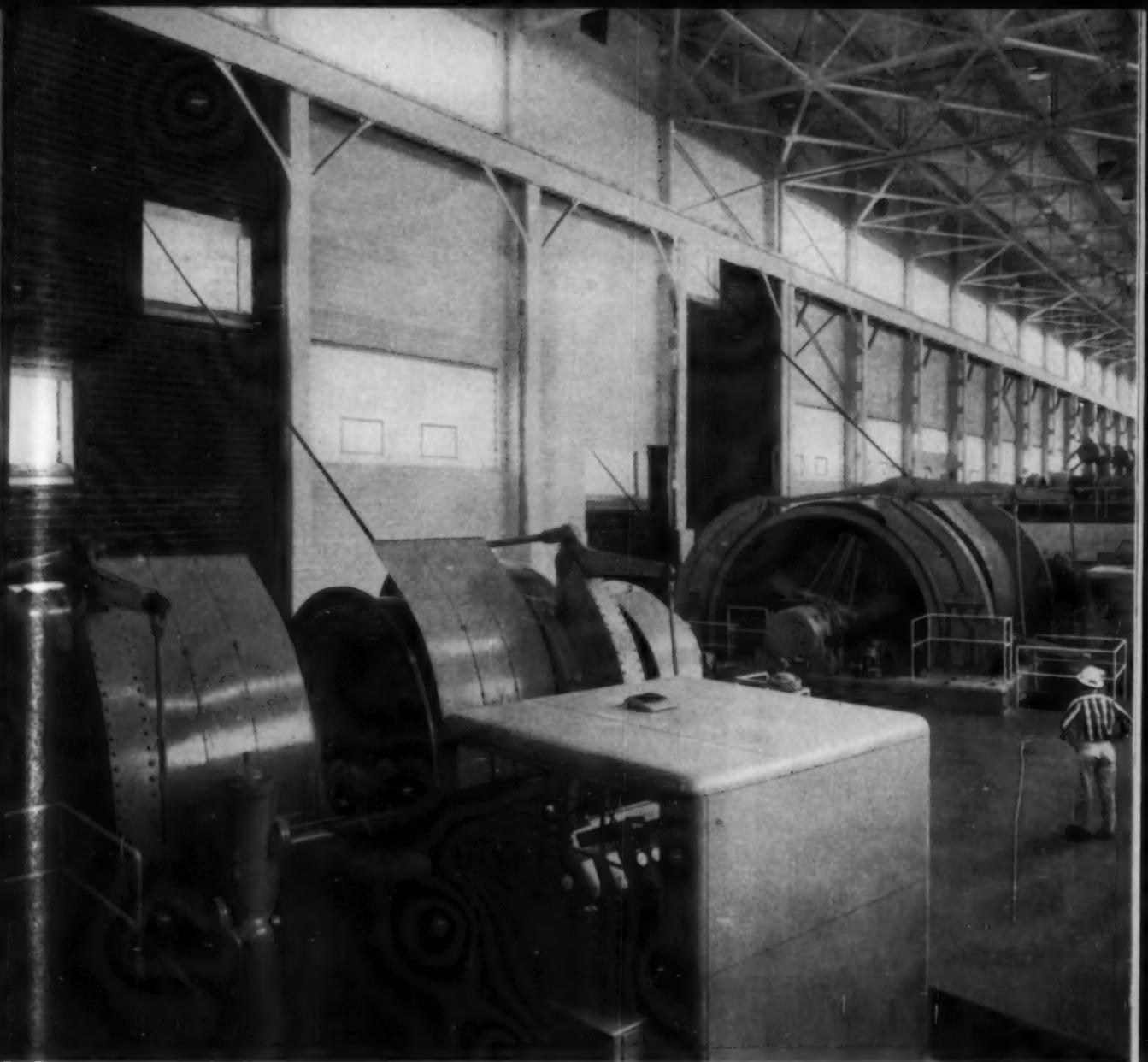
Results of tests on both raw and washed coal are reported on the mine coke index, which is a modification of the standard ASTM hardness factor designed for use with this 30-lb oven.

The miniature oven, which the preparation plant engineer refers to as the eighteenth largest coke producer in the Corporation, has already proven its value by increasing the amount of mineable coking coal in the Columbia and Geneva Mines. Coal that without the coke oven tests would have been left in the ground, was found to have a good mine coke index even though mined from an area close to the outcrop.

After weighing and sampling, the cleaned coal is loaded in cars for shipment to the coke ovens at Geneva Works. At peak operation a 76-ton coal car can be filled every 8 min. Two car retarders on the gravity track position each car under the coal delivery chute.

The Wellington coal preparation plant is an excellent example of the huge investment being made by U.S. Steel to improve the efficiency of its operation with an aim to lower operating cost, and to improve the quality of its products.

It is also, in the words of the Denver & Rio Grade employee publication, *Green Light*, an "Ironclad Declaration of Faith . . . in the future of Western Industry" by U. S. Steel.



Powerful Hoisting Equipment for 2250-ft Shaft. Visible in this neat, efficient layout are hoists for a man-and-materials cage and balanced skips. They're part of the surface equipment of an Eastern iron-ore mine where good housekeeping is a fundamental rule. The shaft served by this installation is approximately 2250 ft deep; circular in shape, it has a diameter of 21 ft 6 in.

The skips, each of 20-ton capacity, operate at 2500 ft per min. The cage can be run at better than 1400 ft per min. Ropes for the hoists are Bethlehem flattened strand, Type H construction, with lang lay and fiber core. Strong and tough, these durable steel cables are more than a match for the heavy demands imposed upon them.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem Wire Rope.

BETHLEHEM STEEL





CONTROL STATION for operating uptrack retarders is located in loading point operator's booth above tracks.



TWO SETS of remotely-controlled retarders on loading track regulate movement of empty cars under loading chute.



VALVES electrically controlled regulate air pressure to retarder cylinders.



UPTRACK VIEW of retarder ahead of storage tracks for loads shows gripper rails and six air cylinders along each side. Operating pressures are 25, 50 or 85 psi.

Pushbutton-Controlled Retarders

No human touches railroad cars at 720 tph plant as empties pass to loading chute, are loaded, run to scale and then come to rest at collecting point for delivery to storage yard at U. S. Steel's Corbin plant.

LOADING AND WEIGHING 720 tph of clean coal without a human hand touching the railroad cars is

achieved with the aid of electro-pneumatic car retarders at United Steel's Corbin, Ky., plant. Raw coal

from the company's Lynch mines is delivered to the plant in railroad cars which are fed through a two-track shakeout by a diesel locomotive. Empty cars are moved to the loading track where the pushbutton-controlled retarders take over while cars are loaded. Cars next run by gravity to retarders at the scale house, are weighed and then run by gravity to a collecting point at another retarder.



SECOND CONTROL for retarders is in scalehouse where operator has clear view of cars approaching and leaving scale.



APPROACHING SCALE, loaded car is slowed to 4 mph. After crossing scale, car joins other loads at last retarder.



CORBIN OFFICIALS Robert Witt (left), plant engineer; Lee Satterfield, general maintenance foreman; and James Stone, general foreman, coordinate operations.

for Railroad Cars

The weighed cars then come under hand control for the first time as a car dropper takes over and drops 6- and 8-car trains to one of the six storage tracks.

Union Switch & Signal electro-pneumatic retarders which control the cars through the loading and weighing sequence have been in service since the plant went on stream over 3 yr ago. Plant management

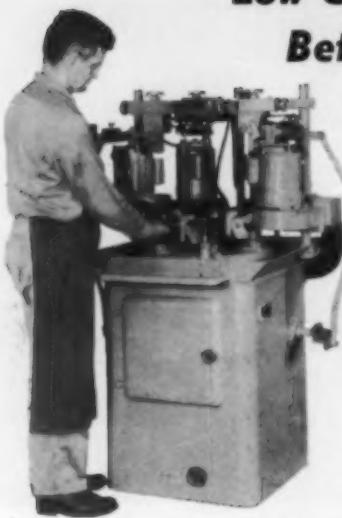
notes that in this time the retarders have been trouble-free and maintenance-free. Replacing one shoe was the only maintenance required other than regular greasing every 4 mo.

How the System Is Laid Out

The electro-pneumatic car retarders are located in four strategic positions: Uptrack from the car-loading chute;

downtrack from the loading chute; uptrack from the scale; and down-track from the scale. Operation of the two retarders near the loading chute is controlled by one man in a booth above the loading track. The scale man controls the two retarders near the scale-house.

As coal flows into a car, the loading-point operator pushes a button to release or engage a retarder as the car is filled. When a car is full, the operator pushes a button releasing the lower retarder, thus freeing the loaded car to run by gravity toward the scalehouse. When the loaded car reaches the retarder up-track from the scalehouse, the scale man pushes a button actuating this retarder and slows the car to less than 4 mph. This slow speed assures



**Low Grinding Costs
Better Performance
Fast Production
Uniform Results
Maximum Bit Life**

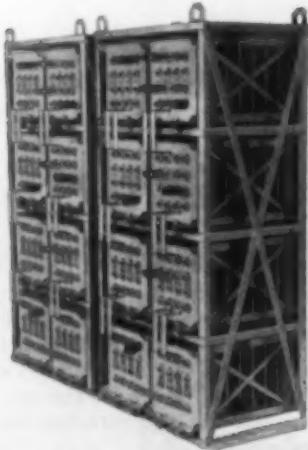
These are a few of the many advantages you get when you grind your bits automatically on the FAIRVIEW BIT GRINDER.

All of these advantages boil down to savings of both labor and wheels, productivity of 250 to 350 per hour, correct angles—smooth finish, more regrinds, more grinds per bit, more tons per grind and elimination of hazardous operation. It's to your advantage to use the FAIRVIEW BIT GRINDER both in the satisfactory grinding results obtained and in the protection of your investment in expensive equipment.

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COMpletely assembled Racked Resistors with all interconnecting bus bars and terminal lugs installed. Custom designed for your individual conditions.

For your heavy service applications we offer Helical Coil construction to end warping and buckling burnouts. One installation proves our modern design is superior. Write for details.

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LOGAN, W. VA.**

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RESISTORS®

the car's staying on the scale for 3 sec, all the time needed to get an accurate weighing and recording on the Streeter Amet recording scale.

The weighed car then runs by gravity to the last retarder where it is stopped. As soon as eight cars are assembled, they are coupled, inspected and tagged by the car dropper, who then drops them to the storage tracks.

How the Controls Operate

Each control switch has four positions: off; first, which applies 25 psi of air to the operating cylinders that move the retarder shoes; second, which applies 50 psi of air to the operating cylinders; and third, which applies full-line pressure of 80 to 85 psi to the cylinders.

Air cylinders move the gripping shoes in or out along both sides of each rail to grip the car wheels at pressures controlled by the operator at the panelboard. Three of the retarders have six cylinders along each side of the track and the fourth unit has five on each side. Total length of a retarder is 40 ft.

Air valves are operated by solenoids powered by seven 2-V wet cells. Batteries are maintained at proper gravity by a trickle charger. Compressed air for operating the retarders is supplied by a compressor inside the preparation plant. It is delivered to a receiver, then passes to a heat exchanger in summer or goes directly to a water trap ahead of the retarders.

The Corbin plant operates three shifts per day six days a week. Most maintenance work is done on the seventh day. The plant is located about 90 mi west of the corporation's mines at Lynch, Ky. The 470-acre plant site, which has disposal room for washery refuse for about 30 yr, is on the main rail line from Lynch to U. S. Steel's coke plants, making it possible to clean the coal in transit without any backhauling.

A. E. Hamlet, plant superintendent, is in charge of the Corbin plant. Other key men at the plant include Lee Satterfield, general maintenance foreman; Robert Witt, plant engineer; James Stone, general foreman; Vernon Asbridge, Charles Vannoy and Charles Quertermous, shift foremen; Clarence Delph, plant accountant; Ewell Cruce, warehouseman; and G. L. Vaynes, district chemist for the Lynch operations.



Bottom-Dump Coal Haulers have capacities of 25, 40 and 51 tons . . . engines from 218 to 360 h.p. . . . dual or large single drive and trailer tires . . . torque converter and Torqmatic drive or standard transmission.

- **Higher Availability**
- **More Tonnage**
- **Lower Costs**

On scores of mining operations all over the world the high job availability of Euclid equipment results in more tons hauled per shift. Because they're engineered and built for the toughest off-the-highway service, "Eucs" stay on the job longer, with less time out for servicing and repairs.

Dependable low cost hauling has made Euclid the preferred equipment for open pit operations in both the bituminous and anthracite fields. If you're interested in cutting your hauling cost for coal, overburden or waste, have your Euclid distributor prepare a production and cost estimate for your operation. There's a good chance he can show you how to haul more tonnage at lower cost.

EUCLID DIVISION, GENERAL MOTORS CORPORATION, Cleveland, 17, Ohio

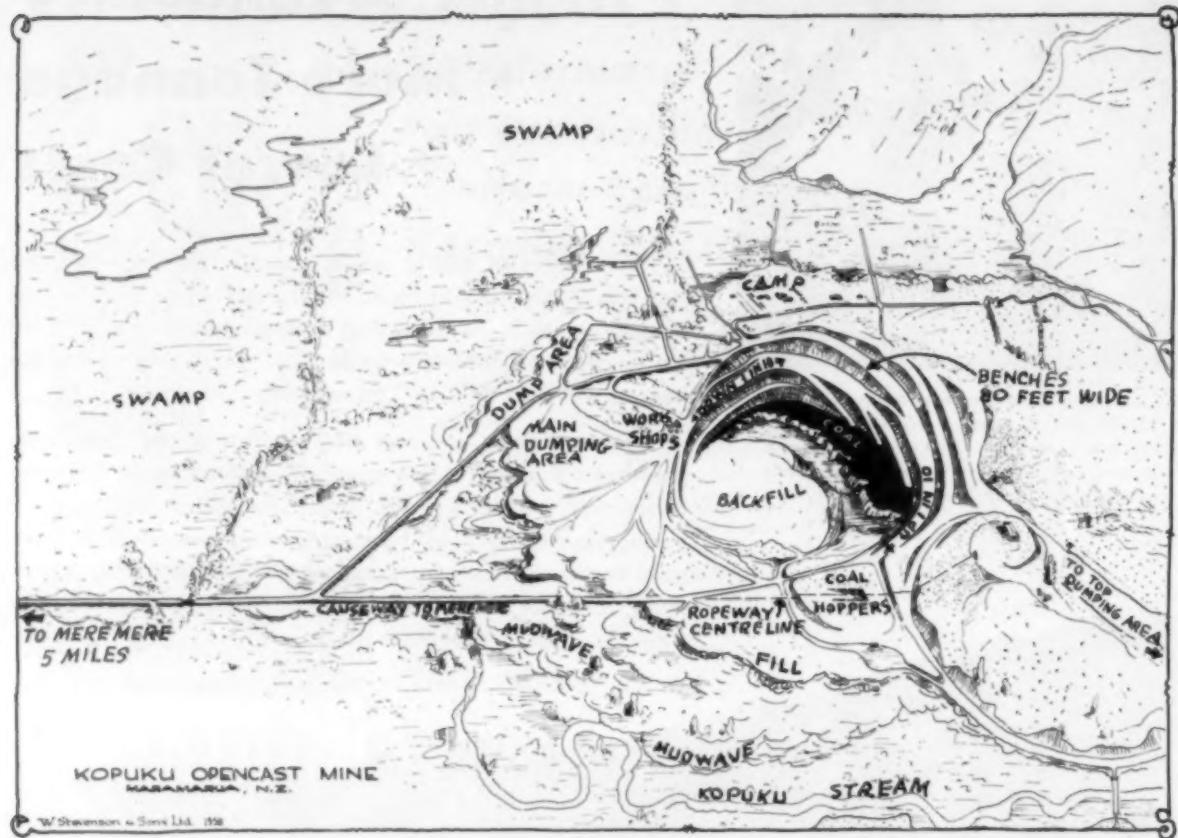


Rear-Dump models are available in 10, 15, 18, 22, 27, 40 and 50 ton capacities with engines of 128 to 670 h.p. . . . standard transmissions or torque converters and Torqmatic drive . . . semi-trailer types have capacities of 12, 22 and 35 tons.



EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE



THE KOPUKU LAYOUT, showing general plan of attack after backfilling has begun. The pit will produce about 600,000 tons per year, which will move out over a mud swamp by aerial tramway built on causeway fill over 5 mi in length.

The Kopuku Story

Coal 50 ft thick under maximum cover of 388 ft is uncovered by rubber-tired and crawler equipment, and is transported 6 mi across mud swamp by aerial tramway.



KOPUKU in the latter part of 1958 (left), with benching well along and shovels loading coal into trucks. Model at right shows the various stages of coal removal to the maximum limits of the pit, which will be 388 ft down at its deepest point.





PUSH-LOADED SCRAPERS remove overburden and haul it to the disposal sites—on the rim of the pit at present but eventually in the worked out part of the pit itself when the coal loading operation has proceeded far enough to permit.



SPECIALLY BUILT ROOTER designed for pull-push operation, along with a second commercial unit, breaks up the hard clay and fireclay for scraper removal.



OUTBOUND ROUTE for Kopuku coal is 6 mi across causeway by aerial tram.

until the present Mercer power station was decided on that Maramarua began to come into its own.

Actually, the pit is operated as a joint venture of Glen Afton (a subsidiary of New Zealand Co-Operative Dairy Co.) and the State Collieries. Of the production slated for the pit, approximately 150,000 tons annually will be used by the dairy organization.

About 50 mi southeast of Auckland, Maramarua is composed of two deposits, the larger of which is the basis for the present Kopuku pit, which will cover about 370 acres with a potential of over 20 million tons. Averaging about 50 ft thick, the deposit is at least 1,500 ft wide and 4,000 ft long. With a slight dip of 8 deg the seam strikes north. At least 240 ft of overburden had to be conquered before the earthmovers even saw the seam and the pit is expected to reach 388 ft at its maximum depth. In full operation the pit will measure 7,900 ft long, 2,600 ft wide at the south end and 660 ft wide at the north end. Full production, using a fleet of shovels and trucks, was expected to be reached by the end of 1958. By May, 1959, it is hoped that the fleet of earthmovers will have uncovered an additional half-million tons. Reserves are expected to last from 30 to 40 yr, depending on future exploitation rates.

The present stripping project began in September, 1956, when the contractor, W. Stevenson & Sons, Ltd., moved in the first of 74 earthmoving machines. Since that time the crews have removed material at an average rate of 3½ million cu yd per year. The 100-man crew has been averaging 11 hours per day, 5½ days a week. Machinery used on the job included 18 Caterpillar DW20s, eight DW21s, six DW15s, two DW10s and two IH Payscrapers in the self-propelled tractor-scaper category. Seven Caterpillar D9s, 18 D8s, one D7, three D6s, two D4s and one IH TD24 make up the crawler fleet. Five Caterpillar No. 12 motor graders, one Adams grader and five Cat No. 80 scrapers round out the total.

In addition to the purchased machines, the Stevenson shops fabricated a large, towed ripper to loosen the hard-packed fire clay. In practice, the two-wheeled ripper is towed by one D9 tractor while a second pushes. With this ripper, and an

Ateco unit mounted on another D9, the overburden is loosened for loading into the rubber-tired haulers for disposal.

Benching and Spoiling

Kopuku is being excavated in benches. A series of three major ones, 80 ft wide and sloped at 1 in 10, have been established. These connect with smaller lead-in benches from the floor. Traffic flows in a continuous pattern on one-way bench roads.

Pushloaded by D9s and D8s, the rubber-tired rigs pick up overburden for the haul to a dump area. Several spoil piles are maintained near the pit, but the main pile is immediately outside the lip of the pit on the edge of the mud swamp. Haul units average the 2-mi run in 7 to 10 min, producing a total of 25,000 cu yd per day. Continued improvements are sought by the engineers to keep the overall efficiency at a peak. Roads are constantly patrolled by the motor graders and machine service is on a definite schedule. Because of peak conditions, speeds of over 40 mph have been recorded by loaded haulers on the roads. As there is a vast quantity of overburden to be disposed of, the mined-out area will be back-filled as the operation progresses.

Tramway Construction

One of the major jobs at the site is the construction of the long-distance aerial tramway. When plans for the power station and mine were originally drafted, some thought was given to building a road around the mud and using trucks to haul the coal to the power station. This plan proved impractical and the aerial tramway was decided upon.

The problem was establishing a causeway over the highly unstable mud. To fill the area, material must reach 30 ft down into the syrupy goo to a stable clay at the bottom. It is like building a highway across a bowl full of jelly. Starting from each side of the 5-mi expanse, earthmovers from the station site and the mine site hauled spoil to the edge of the firm ground and dumped. D8 tractors were used to bulldoze the material into the swamp and, little by little, a stable causeway began to take shape across the morass. Each time a load

of fill was pushed in by a D8, a mud wave formed around it and, several times, waves threatened to engulf the entire operation. These mud waves sometimes rise up a quarter-mile ahead of the dump, lifting trees and submerged logs many feet above the surrounding swamp.

With the causeway established the haul road for the rubber-tired rigs, which runs along the top of it, is maintained as hard and smooth as a modern expressway, allowing the machines to make excellent cycle times.

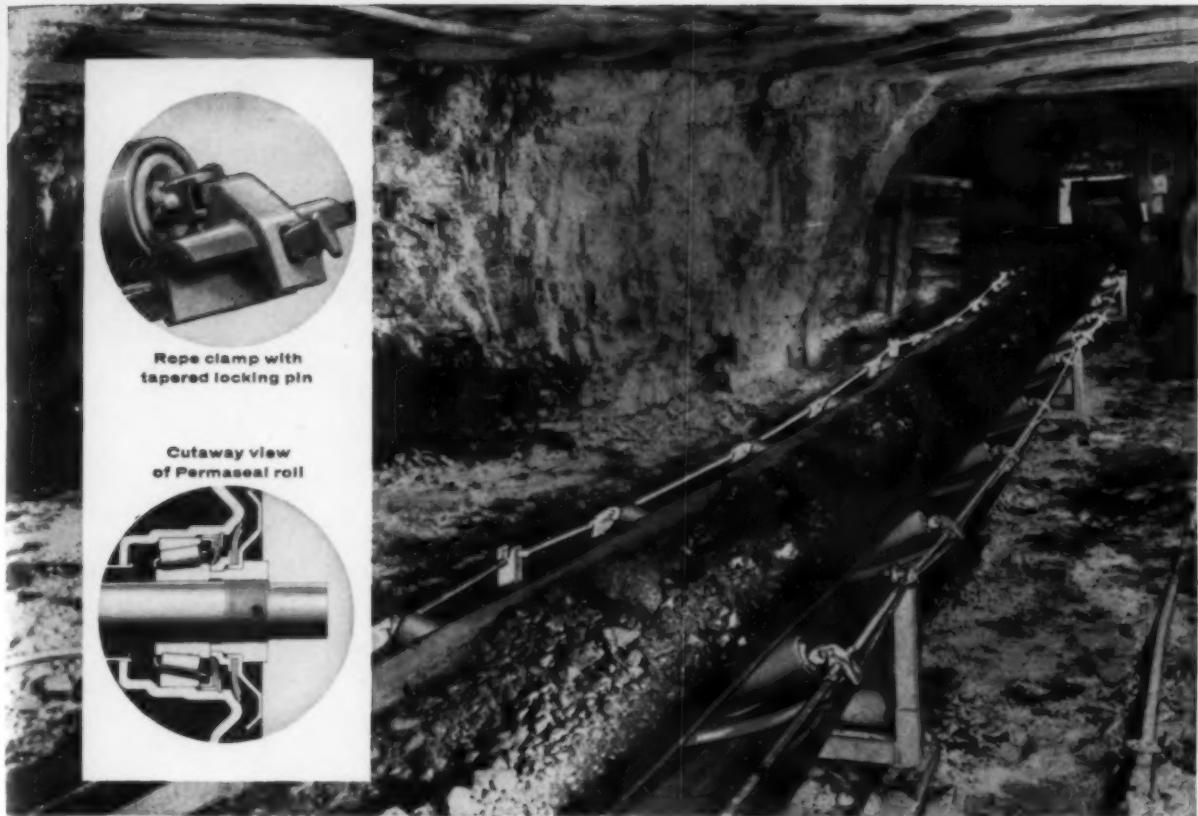
When the causeway has been completed a series of support towers 36 ft tall will be erected along it to the power station. Coal from the pit at Maramarua will be hauled by trucks to a concrete grizzly at the end of the tramway, located at the edge of the pit. There a conveyor belt will load the coal into tramway buckets for the haul across the swamp. At the other end, the raw coal will be crushed and stored in bunkers for the steam turbines.

Coal Storage

In addition to the bunkers, coal will be stored for emergencies up to 3 wk in a 30,000-ton fan-shaped pile next to the station. Stockpiled coal will be kept under water to prevent spontaneous combustion and will be recovered by conveyors. From the bunkers and pile, coal will be powdered and blown into the six biggest boiler units ever installed in New Zealand. Steam at 600 psi for the turbines will be produced at 30,000 lb per hr, and coal will be consumed at a rate of 39,600 lb per hr.

Merger station will require between 600,000 and 800,000 tons of coal per year. The difference will be supplied from the Huntly field. Six units are to be built at the power station, three to be completed in 1958 and the last by July, 1959. A village to house 150 workers will be built as part of the station site. Total cost of the station, cableway and village is estimated at close to £16,000,000 (\$45,600,000).

To house the workers at the stripping site Stevenson has built a complete temporary village. In addition to the housing there is a modern cookhouse, a sick bay with a doctor in attendance, a movie, a laundry and showers. Housing for married workers is under construction.



JEFFREY BELT CONVEYORS

(wire rope type)

have these advantages . . .

Low first cost—Easy and economical to set up with fewer parts; need no belt training idlers; intermediate sections require no cover plates; two parallel wire ropes replace heavy rigid type angles or channel side frames.

Low operating costs—Fewer components to handle or transport saves time in extending or retracting. Little or no spillage means less clean-up time.

Long belt life—Lasts longer as load impact is absorbed by spring effect of wire ropes when load passes over troughing idlers.

Permaseal idlers—Have Timken tapered roller bearings protected by two flexible diaphragm seals. Inner seal retains lubricant. Outer

seal keeps out dirt. Prelubricated for years of maintenance-free service.

Spacing of idlers—Can be changed easily to suit material or mine conditions.

Rope clamp for cradle bracket—Rope clamps with "no loss" tapered locking pins prevent creeping. Cradle brackets and support stands hold ropes parallel. No separate spreader required.

Versatility—These conveyors can be used above or below ground to handle coal, salt, gypsum, iron ore, etc.

For more details send for bulletin 948. The Jeffrey Manufacturing Company, 912 North Fourth Street, Columbus 16, Ohio.

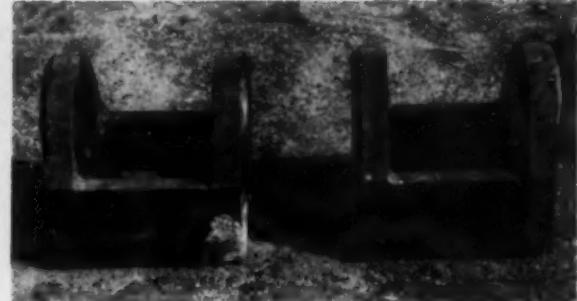


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BOOM POINT SHEAVES, 46-CU YD STRIPPING SHOVEL— $2\frac{1}{2}$ -in "T-1" plate in hub, $\frac{1}{2}$ -in "T-1" plate spokes (outside ring of SAE 4130). "T-1" replaced casting, gave needed dependability and higher strength in this critical component which supports entire weight of bucket and payload.



STIFF LEG FOOT, 46-CU YD STRIPPING SHOVEL— $2\frac{1}{2}$ - and $\frac{3}{4}$ -in "T-1" plate. Weldment replaced casting, eliminated danger of costly failures, insured permanent service.



GANTRY CLEVIS, 46-CU YD STRIPPING SHOVEL— $6\frac{1}{2}$ -, 4-, and $\frac{3}{4}$ -in "T-1" plate. Weldment eliminated casting-failure problem, guaranteed long dependable service life.

Applying New Alloy Steel For Lower Strip Maintenance



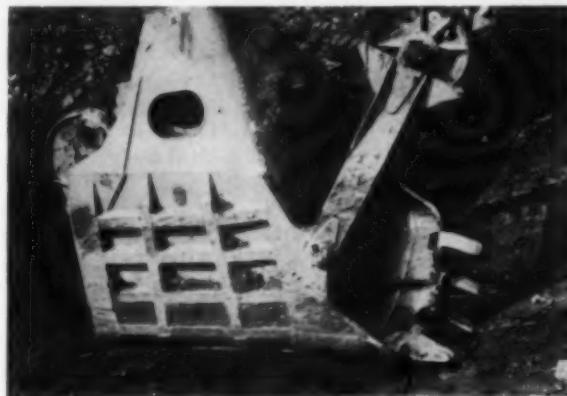
GEAR BLANK— $5\frac{1}{2}$ -in "T-1" plate. Replaced casting for higher strength at the teeth.



CABLE EQUALIZER, 46-CU YD STRIPPING SHOVEL— $6\frac{1}{2}$ - and 2-in "T-1" plate. "T-1's" higher strength and better abrasion-resistance compared to casting (left) resulted in reliable long-term service for this highly-stressed component.



BUCKET LIP, 46-CU YD STRIPPING SHOVEL—“T-1” 6½ in thick (except bases of Mod. SAE 4337). High strength, toughness and superior abrasion resistance made it the choice over castings.



24-CU YD STRIPPING BUCKET—“T-1” plates up to 5½ in thick. High strength reduced weight, increased payload more than 40% over original 17-cu yd cast-steel bucket.



DIPPER TOOTH, 65-CU YD SHOVEL—2-in “T-1” web, 1½-in “T-1” top plates (SAE 4340 point). Superior abrasion resistance increases life and strength, reduces tooth breakage.

Versatile new high-strength alloy replaces castings for greater strength and longer life, and permits major increases in bucket size because of light weight. Abrasion resistance prolongs life in many preparation applications.

By Andrew Hyslop, Chief Engineer
And D. S. Kleckner, Superintendent
Hanna Coal Co., Cadiz, Ohio

STEEL is a critical element in the strip operations of the Hanna Coal Co. since its strength, weight and resistance to wear are major factors in effi-

ciency and maintenance. Hanna's interest in steel, therefore, is a keen one, and has led it to cooperate actively in steel development. An example of this cooperation is “T-1” steel, introduced commercially less than 4 yr ago. Hanna's interest, however, goes back to 1949.

Hanna now uses this versatile, extraordinarily-high-strength alloy steel,

firebox quality, produced by Lukens Steel Co. and the United States Steel Corp., for lip plates, gantry clevises, cable anchors, sheaves, bucket teeth, boom bases, gears, stiff-leg feet and even cutter heads and pump impellers on dredges. All these and other items are fabricated in the Hanna shops from this single type and grade of steel.

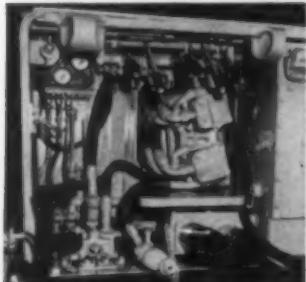
Type and Properties

“T-1” is a quenched and tempered steel with a minimum yield strength of 100,000 psi, more than three times that of ordinary carbon steel. In addition to its high strength “T-1” has other properties of special interest to

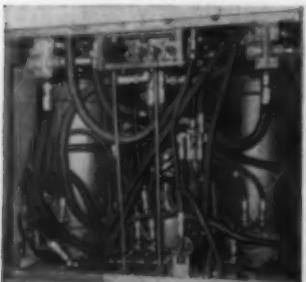


There are 37 'Dosco Miners' at Dosco's Cape Breton, Nova Scotia mine.

Aeroquip Hose Lines Add Dependability to 'Dosco Miner'



Hydraulic control lines on the 'Dosco Miner' use Aeroquip Hose Lines with Aeroquip Elbow Fittings.



Aeroquip High Pressure and Medium Pressure Hose Lines on the 3-pump gear case of the 'Dosco Miner'.

Continuous Mining Machine Designed by Dominion Steel & Coal Corp., Ltd., Sydney, N. S.

Digging and loading 500 tons of coal in an 8-hour shift is routine for the mechanical 'Dosco Miner'. Designed and constructed for long, rugged service, this continuous miner uses dependable Aeroquip Hose Lines for its hydraulic power and control systems.

Reduce downtime with Aeroquip Hose Lines with Reusable Fittings for replacement of all hydraulic, lube oil and air lines. It takes only minutes to make up quality hose assemblies using ordinary bench tools. Get full details from the Aeroquip Distributor listed in your Yellow Page Phone Book, or write us.



Aeroquip

AEROQUIP CORPORATION, JACKSON, MICHIGAN

INDUSTRIAL DIVISION, VAN WERT, OHIO • WESTERN DIVISION, BURBANK, CALIFORNIA
AEROQUIP (CANADA) LTD., TORONTO 19, ONTARIO

AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

us—chiefly its toughness and abrasion-resistance. In addition, the material is readily formed and welded.

Our original goal was increased machinery capacity through a lighter-weight bucket. By using high-strength "T-1," for example, we were able to increase an original 35-cu yd shovel to 46 cu yd by substituting an original-design "T-1" bucket. We also succeeded in raising the capacity of a 17-cu yd shovel to 24 cu yd through the use of "T-1."

A second goal, increasing service life, soon became feasible through the toughness of "T-1." Today a substantial part of our "T-1" consumption is in bucket-liner replacements, where high strength is not considered as important as ability to withstand impact and abrasion.

Castings Replacement

On the strength of these successful applications of "T-1" we have, within recent months, started a third program—to replace shovel components that previously used steel castings with "T-1" weldments. Our experience with castings has proved that there is no practical way to insure long service life—or even to be sure that new castings will not fail the moment they are placed in service. "T-1" weldments have thus far proved extremely satisfactory as replacements for gears, bucket teeth and other shovel components (see pictures). The superior service of the weldments indicates that "T-1" should be specified in the original design.

Abrasion Resistance

The abrasion-resistance properties of "T-1" have also permitted use of a flash dryer stack, for fans operating under dust and sulphuric fume conditions, and as a cutter head and pump impeller on a dredge.

We have also used "T-1" for chute maintenance and replacement in the Cadiz plant, replacing many mild-steel and low-alloy installations.

Hanna has always attempted to put the most efficient, economical type of steel to work in each and every phase of its operations. Although we still use a variety of steels we find "T-1" to be the most versatile high-strength material available. In fact, because of the variety of end uses, we now regularly stock a 90-day supply of "T-1" in $\frac{1}{4}$ -, $\frac{3}{8}$ -, $\frac{1}{2}$ -, $\frac{3}{4}$ -, 1-, $1\frac{1}{4}$ -, $1\frac{1}{2}$ -, 2-, 3-, 4-, $5\frac{1}{2}$ - and 6-in thicknesses.

FALK Steelflex SPACER COUPLINGS

save time and money in industrial operations

STEELFLEX are Registered Trademarks

Cut disconnect-reconnect time by as much as 50%

The FALK Spacer Coupling is specially designed for quick installation or removal without disturbing the driving or driven unit. This feature can save you up to 50% in disconnect-reconnect time when critical equipment—a process pump, for example—needs repair or replacement.

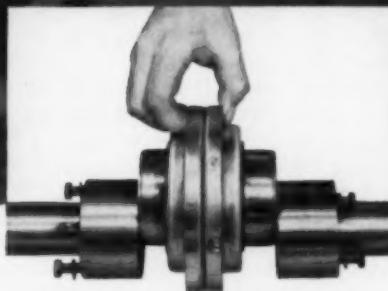
Here's another saving: with the FALK Spacer Coupling, you can quickly realign shafts without the usual loss of operating temperature!

And still another: you can remove or reinstall the FALK Spacer as a unit without draining the lubricant.

Because of its exclusive grid-groove Steelflex design, the FALK Spacer can accommodate residual misalignment—parallel, angular, or (most important) both. Also, it provides torsional resiliency that cushions shock and vibration. Thus it saves wear-and-tear on your connected equipment.

To prove these claims and enjoy these savings, install a FALK Spacer on one application—and see for yourself. Consult your FALK Representative or Authorized Distributor.

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN
MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS
Representatives and Distributors in many principal cities.

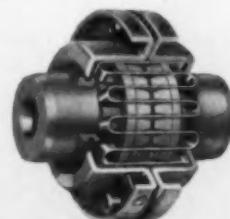


EASY AND QUICK TO INSTALL, DISCONNECT OR RECONNECT

First, mount shaft hubs to allow proper distance between hubs; then, align driving and driven units.

Second, compress Spacer to fit space between hubs and tighten cap screws to pull spacer hubs into the registered fit.

To disconnect, reverse the second step. No draining of lubricant necessary.



The heart of the FALK Spacer
...the basic Type F Steelflex
Write for Service Manual 4838

FALK
...a good name in industry

"Our first 24's stripping record sold us on our

—Luttjohann Stone Co., Topeka, Kansas

"When our first Torque-Converter TD-24 went to work in November, 1957 it stripped 50% more overburden than its steering-clutch competitor," reports John Luttjohann, Luttjohann, Stone Co., Topeka, Kansas. "It cut our stripping costs per yard so much, we bought our second one in June, 1958.

"Now the two TD-24's are giving us lower stripping costs than we've had in recent years, in the face of generally higher costs. The Torque-Converter '24's are superior machines, powerful enough to push big loads in all conditions, even when frequent heavy rain made a swamp of the quarry.

"24's are fast, so we can make the long pushes pay off. And '24's are trouble free. We haven't lost any time with these two machines in almost 2,000 hours of the roughest work in the quarry."

Luttjohann Co. compared performance!

The Luttjohann's proved by direct comparison that their Planet Power-steered TD-24 could rip and strip 50% more overburden than a 20-ton steering-clutch competitive rig.

Planet Power steering eliminates load-limiting "dead-track drag," keeps full-time "live" power on both tracks. You don't "half-kill" your power and traction to control the TD-24—on turns as you must with any king-sized steering-clutch tractor. You get bonus-load follow through—and don't spill the extra-profit yardage with "jerky" steering.

You can "adjust" TD-24 track speed to assure full-bite performance, benching or highwalling—where steering-clutch rigs can only "nibble"!

Prove the big yardage increase you can get with a Planet Power-steered International TD-24. Measure the capacity increases you also get with this Hi-Lo, full-power planetary shifting. Check the fast production-boosting TD-24 reverse speeds. Ask your International Construction Equipment Distributor for a demonstration!



International®
Construction
Equipment

International Harvester Co., 180 North Michigan Avenue
A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors... Self-Propelled Scrapers and Bottom Dump Wagons... Crawler and Rubber-Tired Loaders... Off-Highway Haulers... Diesel and Carbureted Engines... Motor Trucks... Farm Tractors and Equipment.

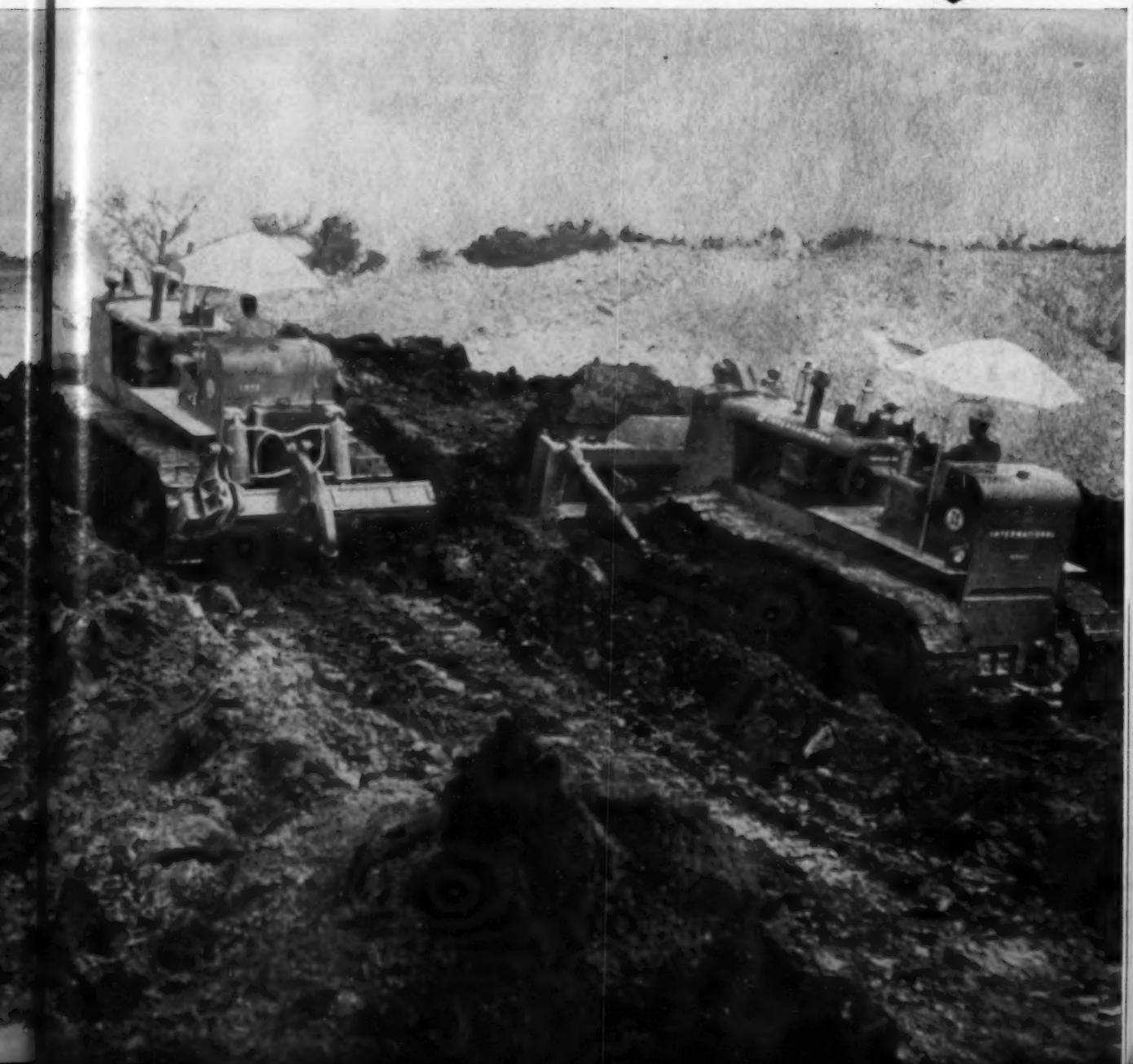


*economy
second"*



With the ripper-equipped Torque-Converter TD-24, the Lutjohann quarry rips tough rock layers into movable spoil. They push slabs of rock as heavy as 40 tons, with the blade. Daily crusher output average is about 1,000 cu. yd.

One TD-24 sells another by outproducing a king-sized competitive crawler by an amazing 50%—stripping overburden in side-by-side comparisons at Lutjohann Stone Co., Topeka, Kansas! Here are their Torque-Converter "24's."



These are the profit-proven features that lead to Payhuler® fleet ownership

Look into the rock-lugging, grade-beating 24-ton "95"...

- **Bonus-powered**, with a 335 hp high-torque turbo charged diesel engine to beat steep grades and high altitudes with full payloads!
- **Your choice of torque converter** with powershift, or 9-speed constant mesh transmission. Speeds to match every load and road.
- **Shock-cushioning** of planetary drive axles.
- **Massive frame stamina**—with 277 lbs. of high-strength, shock-resisting steel for each rated ton of carrying capacity.

- **Springs with extra leaves and extra length** to cushion the payload, smooth the ride.
- **Positive power-steering, Torqmatic braking, panoramic vision**, for unmatched operating ease and load-speeding safety.
- **Up to 25% higher hauling speeds**—the "95" can haul, fully loaded, up to 38 mph.
- **Faster reverse speeds**—for spotting to load, or positioning full loads for dumping. The gear-drive "95" can travel up 7.1 mph. in reverse.
- **9-second dumping**—another cycle-speeding feature.

...and the 250-hp, 18-ton "65" has equally outstanding features.



International® Construction Equipment

International Harvester Co.
180 North Michigan Ave., Chicago 1, Illinois

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors... Self-Propelled Scrapers and Bottom Dump Wagons... Crawler and Rubber-Tired Loaders... Dolly Highway Headers... Diesel and Carbureted Engines... Motor Trucks... Farm Trucks and Equipment.

Power for steep grade climb-outs wins steady job for five "65's"

Bonus Turbo Charged Diesel power to deliver extra-tonnage loads up a haul road with a 17% average grade accounts for the dependence of Caldwell Engineers on five "65" Payhulers—on the \$13 million hydro and flood-control Oliver Dam, Columbus, Ga.

Contractor doubles load delivery speed with positive Torqmatic braking!

Central Pennsylvania Quarry and Stripping Co. credits Torqmatic braking of their 5-unit "95" Payhuler fleet with doubling load delivery speed—by increasing safe downhill hauling speed. They've compared "95's" directly to other off-road equipment on rock-hauling duty!



High-p...
inbuilt
98.5 w...
is the n...
Rock ov...
Project,...
from re...
reserve

erfeatures etownership!

Prove what it means to command the Payhauler ratio of power to payload—for hauling up to 25% faster; beating grades and altitude. Try Payhauler "pick-up-truck" spotting ease—"zip-around" power steering—exclusive high reverse—and all the other Payhauler advantages. See your International Construction Equipment Distributor for a demonstration!



High-percentage availability proves inbuilt stand-up-ability!

98.5 work availability through one measured 12-week period is the mark set by a 10-unit "95" Payhauler fleet—high-balling rock over steep High Sierra grades, on mammoth Pool Hydro Project, for Southern California Edison Co. Such records result from reserve power, reserve frame and transmission strength, and reserve shock-resistance!

Another thirty "95" Payhaulers join Merritt-Chapman and Scott fleet!

Merritt-Chapman and Scott Corporation has added thirty more "95" Payhaulers to their Niagara Power project equipment spread. Now, the M-C and S Payhauler fleet totals 62 units—largest in the world! On St. Lawrence Seaway, huge Glen Canyon dam, and Niagara Power Project, M-C and S have proved rock-lugging, grade-beating Payhauler performance—and confirmed their satisfaction with repeat orders.



Foremen's Forum



SELF-EDUCATION is never easy—but it will pay off in satisfaction, as well as money.

So You Didn't Go to College!

"The things that really count—confidence, understanding and the development of a broadminded, dynamic attitude toward life—can be acquired off-campus as well as on."

THE TITLE of this piece happens also to be the title of an interesting pamphlet which crossed our desk recently. It is Public Affairs Pamphlet No. 249, issued by Public Affairs Committee, Inc., 22 East 38th St., New York 16, N. Y., at a price of 25c. The authors are Jerry Klein and Bill Fisher, Jr. The heart of its message is that opportunity is open to everyone and that the lack of a college degree is not a bar to personal progress. The authors point out that more than 60% of our population over

25 yr of age has had an eighth grade education or less. Only 11% of this age group has gone to college or beyond and they don't come close to filling our needs for highly skilled workers, executives, scientists and engineers.

According to the National Manpower Council, among individuals with the most aptitude for learning—those who have scored on intelligence tests in the upper 6% of the population—less than half graduate from college. Those who don't go to college take their stations in life

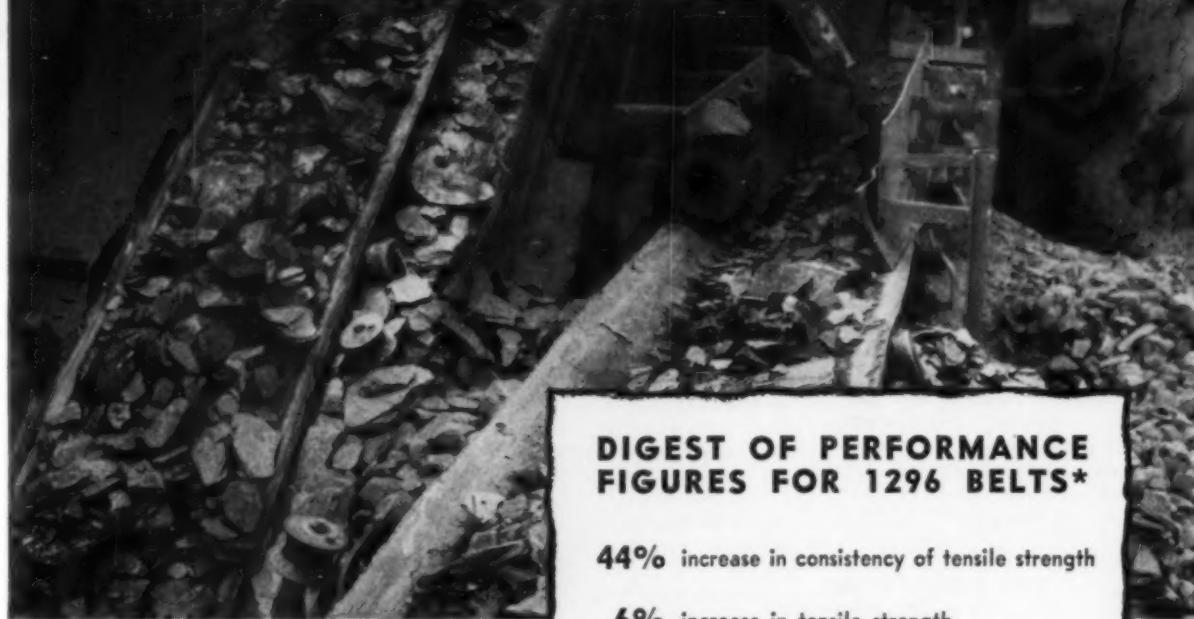
and some reach the sublime heights of fame and fortune.

Your move first

The door to success is as wide open today as it's ever been. Whether or not you walk through it depends on the kind of person you are, and that, in turn, is affected by a number of factors including your education, the authors point out.

The increasing need for highly trained workers and technicians is providing

FIELD REPORTS PROVE SUPERIOR PERFORMANCE OF NEW BOSTON BELTS



DIGEST OF PERFORMANCE FIGURES FOR 1296 BELTS*

44% increase in consistency of tensile strength

6% increase in tensile strength

130% improvement in consistency of elongation

* Compared to belts previously manufactured

HERE'S WHAT DOES IT!

The startling figures above are a direct result of two major belt manufacturing advancements — both developed by, and exclusive with, Boston Woven Hose & Rubber Co.

ADVANCEMENT #1 **BALANCED BELT CONSTRUCTION** for the first time equalizes ply stress so that each ply pulls its full share of the load. BBC eliminates lazy plies. A BOSTON exclusive because only BOSTON can combine Electronic Tension Controls with Rotocure, the continuous method of vulcanization, which assures uniformity throughout the belt.

ADVANCEMENT #2 **DULON** markedly improves the aging characteristics of BOSTON belts. An exclusive BOSTON research development, the tough specially treated cover compound stays resilient longer . . . makes the belt much more resistant to abrasion, gouging, tearing and oxidation.

BALANCED BELT CONSTRUCTION plus **DULON** add up to
longer belt life . . . less trouble in service . . . greater economy.

BOSTON

BOSTON WOVEN HOSE & RUBBER COMPANY

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BOSTON 3, MASS.



INDUSTRIAL HOSE



BELTING



V-BELTS



PACKING



MATTING



TAPE

Foremen's Forum (Continued)

new opportunity for millions. Automation, which may someday put an end to most human labor, creates an enormous demand for trained people to maintain the complex machines.

But there is more to life than just working. We have to learn to live effectively, to be useful citizens, to better understand ourselves and those we live with. This broader understanding is part of education, too. The things that really count—confidence, understanding and development of a broad-minded, dynamic attitude toward life—can be acquired off-campus, as well as on.

You only have to look around you to realize this. You undoubtedly know leaders in your community—capable, cultured men and women—who have never been to college. There are thousands of them in this country, and they suffer no handicap in comparison to college-trained men and women.

The purpose of education is to gain a greater understanding of the complex world about us. The necessary information is available to all. Most of it can be found in books; some in current periodicals and newspapers.

Reading is the key

The key to learning lies in reading, for the non-college man and the college man alike, the pamphlet states. An organized reading program is of great value. Books like Wells' *Outline of History* will help open up the storehouse of knowledge of man's past. *Mathematics for the Millions* by Lancelot Hogben (Norton) offers a basic understanding of mathematical science. Your reading can be further channeled into economics, government, literature, music, philosophy, science and religion by helpful volumes like *Reading for Enjoyment* by Donald MacCampbell (Harpers).

Also included in the pamphlet is a list of the "Sixty Great Novels of All Time," selected by Professor William H. F. LaMont of Rutgers University. These will provide a greater understanding of the world we live in. (We can't reproduce the list here, but it alone is worth the price of Pamphlet No. 249.)

For those who want more guidance in their reading, there is the "Great Books" program developed at the University of Chicago. The Great Books Foundation has laid out a 5-yr reading program, each year's supply of paper-bound books costing about \$11. Participants read each book, then discuss it in groups with the help of a leader specially trained by the foundation. Your local library may offer the program.

The authors point out that a truly educated man will not limit himself to the study of the masterpieces of the



KNOW THE JOY of learning. The key to learning is good reading.

past. He will also try to find out as much as he can about the world of today. It involves careful reading of the more significant articles in a really good daily newspaper. A weekly magazine of opinion and a good monthly should give you the kind of information that will make you a more effective citizen.

Then there are the limitless opportunities provided in adult-education programs. You can learn just about anything you want to learn—for vocational advancement, spiritual enrichment or just plain fun—provided you're willing to put forth the effort.

Men who did it

Some really made the grade without college. General David Sarnoff, chairman of Radio Corp. of America, and a

Russian-born immigrant, was 15 when his father died. He went to work at \$5 a week as messenger for a cable company to help support his family, and he went on from there. Charles E. Wilson, former president of General Electric, left school at 12 to take a job at \$3 a week. He studied accounting and industrial management at night and took a correspondence course in electrical engineering. Other "grads" of correspondence schools are Eddie Rickenbacker of Eastern Airlines, Walter Chrysler, Senator Ralph Flanders and Dan Kimball, former Secretary of the Navy.

John L. Lewis and James F. Byrnes never got past elementary school. Ernest Hemingway and J. C. Penney did not get to college. Neither did Roy W. Howard, president of Scripps-Howard newspapers.

The upshot is that anyone who participates in selected adult-education pursuits, and does the required work, need have no feeling of inferiority for not having attended college. The intellectual stimulus is fully comparable to the intellectual experience gained in the college classroom. On every level, adult education programs are becoming broader, deeper and more significant each day. But, like anything else, adult education, to be truly useful, must be used.

You can use it to get a better job or earn more money. You can use it to increase your understanding of the world you live in. Or you can use it to make better use of your leisure hours.

The Will to Survive

THE RECENT RESCUE of 19 miners after long entombment in the Nova Scotia workings has resulted in the uncovering of similar ordeals suffered by miners in the past. One of our correspondents sends us word of several entrapments in the Pennsylvania Anthracite region. One such episode is known as "The Miracle of Jeanesville," in which four men were rescued alive after 18 days in a mine near Hazelton, Pa. The four men, Joe Metuskowitz, Wasil Franko, John Barno and John Thomas Husky, were trapped when an influx of water on Feb. 4, 1891, forced them to seek refuge at the top of a breast.

For 18 agonizing days they waited. They had three pieces of bread, and water which they dipped from a lower manway. They kept as warm as they could under sheets of mining paper. They slept a lot. And they prayed when they were not sleeping.

The story of their plight is contained in the records of J. J. Corrigan of Wilkes-Barre, Pa., anthracite historian.

These records also show that seven men were rescued April 28, 1879, after five days entrapment following a cave-in at a mine near Wilkes-Barre. They butchered a mine mule for sustenance. One of the miners was a 13-yr-old boy, John Clark.

Three men were rescued Feb. 9, 1891, after five days underground at West Nanticoke, Pa. They were trapped by a flood of water after a barrier blast.

On Nov. 24, 1928, five miners were rescued after eight days without food and water at a mine near Hazelton. They were cut off when a creek broke into the workings.

These stories, like the one from Springhill, demonstrate the astonishing toughness of the human spirit as well as the human physique.



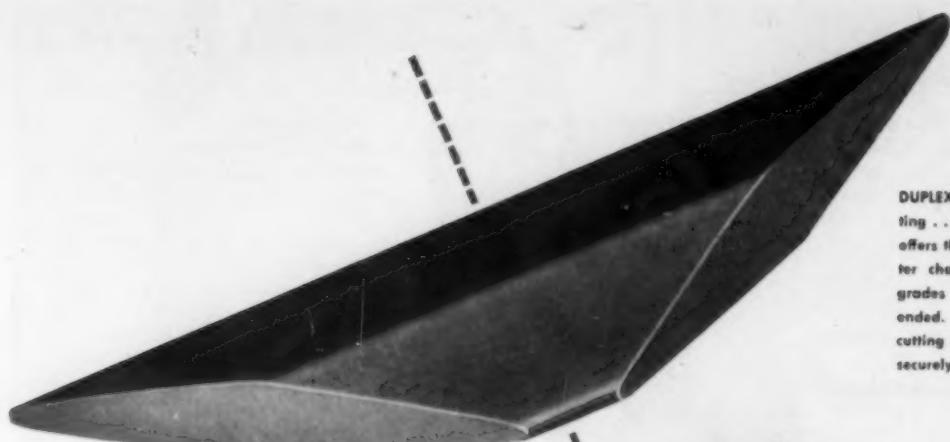
New Skip Hoist System...

.... fully automatic from underground trip feed and rotary dump, controlled by indicating instrument panel in hoist house. This skip system can deliver 880 tons of coal per hour, increasing former caging output by 25%.



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DUPLEX C-11 . . . for all purpose cutting . . . this superior CINCINNATI BIT offers the best obtainable value in cutter chain bits. Available in various grades . . . is reversible and double ended. It has sharp points . . . keen cutting edges . . . long life . . . locks securely . . . easily removed.



DUPLEX F TYPE . . . TIPPED BIT . . . where cutting conditions are applicable to the use of tipped bits . . . Cincinnati's exclusive tipping process makes this the lowest cost, longest life, throw-away type carbide tipped bit available.

CINCINNATI MINE . . . pioneered and developed the DUPLEX BIT . . . still the finest bit offered.

"CINCINNATI" offers the broadest line of precision reversible, double-ended bits for every cutting problem. When you do business with "CINCINNATI", you are assured of a dependable source of supply. The Cincinnati Duplex Bit excels in exacting detail as to size and shape which gives longer life to Chain Block and Holder. Also assures proper bit gauge . . . which reduces load on machine to a minimum and cuts down operating costs on all equipment. For your special protection every bit is electronically tested for size or any imperfections. Remember . . . There Is Only One Duplex Bit.



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CINCINNATI 25, OHIO

Cincinnati Duplex Bits in conjunction with the Cincinnati Duplex Chains guarantee you the best combination available.

Specialists in cutting equipment for over 35 years



Many Industrial Plants Use Both
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Industrial operations requiring both sand pumps and acid pumps are increasing almost daily. And now, more than ever before, efficient, low-cost pumping is a prime consideration. For this reason many plant operators choose the Wilfley team. They know Wilfley sand pumps and acid pumps consistently increase production and reduce operating costs. Wilfley's long-standing record of day-in, day-out dependability is a record you can rely on. Put Wilfley pumps to work now... every installation is job engineered to give you maximum efficiency and economy.

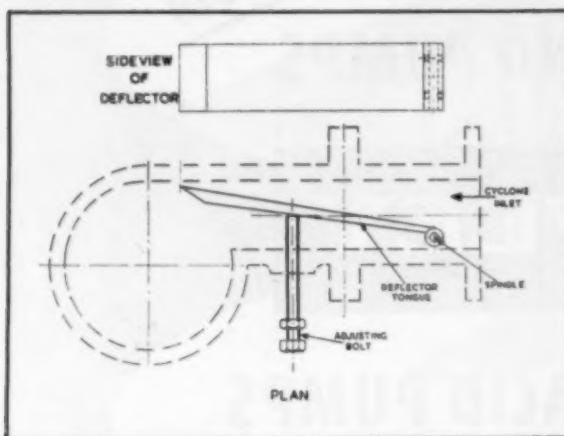
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Operating Ideas



Cyclone Handles Tailings

A MODIFIED CYCLONE is successfully handling froth-flotation tailings at a number of coal preparation plants in England, according to *Colliery Guardian*. The cyclones have been introduced as a simpler and lower-cost alternative to filtering the wet tailings.

The tailings consist of very small shaly particles which are usually flocculated, settled and concentrated in a thickener tank. Final dewatering is usually done by filters.

Since an ordinary low-pressure cyclone was not suitable for the job, a modified cyclone was designed with an adjustable inlet and a set of six interchangeable outlet nozzles. The adjustable inlet consists of a deflector tongue which can be adjusted to vary the constriction at the throat of the inlet passage. The purpose of this constriction is to make the tailings enter the cyclone at a very high speed.

The six outlet nozzles are set on a plate mounted between two flanges secured at the lower end of the cyclone. The purpose of these nozzles is to obtain a discharge with uniform moisture content under varying load conditions, the nozzle being changed as conditions vary.

In operation, tailings from the thickener tank are pumped to the cyclone, inside which they attain a high centrifugal speed. Most of the solids are discharged through the nozzle into the refuse circuit, and are low enough in moisture to be easily handled. The cyclone effluent carries a portion of the extremely fine solids, which are returned to the thickening tank. Although most of these superfines are recovered on repassing through the cyclone, a small surplus accumulates and has to be removed from the system, either continuously or at intervals by filtering. The filtering equipment required for this small residue is very much smaller than would be needed if no cyclone were used.

Proper Maintenance Increases Bearing Life

FOREIGN MATTER and lack of lubrication are the most frequent reasons why bearings fail, says C. V. Borro, service engineer, Caterpillar Tractor Co. Keep bearings in their original packaging until you are ready to install them. When installing a new bearing handle it with care. During manufacture and storage, bearings are protected with a coating of lubricant and packed inside a paper wrapper. This lubricant should not be washed from the bearing. It is virtually impossible to wash a bearing as clean as it was when packed.

Touch bearings as little as possible because perspiration starts corrosion. Use clean lint-free rags. Never use cotton waste to wipe a bearing or its mating surfaces.

Serviceable used bearings also require special handling. Take time to examine the assembly. Countless bearings have been ruined because someone didn't know how to take the assembly apart and put it back together. Bearing pullers or an arbor press are handy tools to have around when removing or installing bearings. Improvised tools will work, but considerable care must be taken to avoid damage.

When a piece of equipment is taken



apart, the bearings should stay with the member to which they are tightly fitted. In the case of bearings which are made with an inner ring, outer ring and ball or roller assembly, both rings often may fit tightly. Always determine whether it is best to press or pull on the race or cup when the bearing is tight on the shaft or bore. Always press or pull straight and square to keep the ring from cocking. A cocked bearing can

easily score the shaft or housing or cause damage to the bearing itself. Never press or pull against bearing shields or separators. Remember that in most cases a bearing can be reused, if you remove it correctly.

After the bearing has been removed, wash it in a solvent until it is absolutely clean. Next, determine if it is still serviceable. Here are some reasons for replacing a bearing:

1. Broken or cracked rings.
2. Dented seals or shields.
3. Cracked or broken separators, balls or rollers.
4. Flaked areas on balls, rollers or raceways.

5. Bearings which have been overheated. Overheated bearings are generally darkened to brownish blue or blue black.

6. Dented or "brinelled" raceways.

If the bearing is found to be serviceable, apply a protective coating of light grease. Rotate the bearing slowly to make sure all surfaces are completely lubricated. Then wrap it in a clean paper with the bearing's identification clearly marked on it. This practice will eliminate unnecessary handling.



CONVEYOR BELTS

"After 20 years, 'U.S.' still gets the replacements," says plant foreman



Mr. James Campbell of Guyan-Eagle Coal Co., Kelly (West Va.), knows why Guyan-Eagle has been using (and replacing with) "U.S." belts for the last two decades... why today they have 17 belts operating in their 5 mines. In the words of the company's own officials, U. S. Belts are:

- "The most dependable in our experience."
- "Resistant to abrasive action of rock."
- "Strong, durable — maintenance is minimum."

That's why, when Guyan-Eagle opened its latest mine (No. 5) it was no surprise that they equipped the system

with "U. S." Belts to move the 5,000-ton daily output. Once a "U. S." Belt user, always a "U. S." Belt user.

The 6 "U. S." Belts in No. 5 mine range in size and capacity from the 195", 42"-wide stoker coal conveyor up to the 1700' main slope belt, a 48"-wide U. S. Giant® carrying 515 tons of ROM coal (up to 500-lb. lumps) to the shaking screens in the scalping plant. All are performing perfectly.

When you think of rubber, think of your "U. S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and the finest quality industrial rubber products.



Mechanical Goods Division

United States Rubber

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Operating Ideas (Continued)

Helpful Suggestions for Safer, More Efficient Welding

EVERY welding shop is a natural home-
stead for certain little creatures whose
job it is to cause fire. Some people
call these creatures imps, others call
them gremlins, but whatever you name
them—they are dangerous to life and



property. No one can eliminate the possibility of accidents, but by making the following practices, adapted from *Linde Tips*, part of your shop routine you can reduce the chances of the unexpected happening, and increase work efficiency.

Be Cautious

Taking safety precautions for repair and installation work is very much different than for production welding where materials used and the type of welding are same for all pieces of work. The material, type of weld and location of the work may vary greatly with each job. Because of the varying conditions you have to set up different safeguards for each individual repair and installation job. First check to make sure there are no flammable materials around. See to it that no one intends moving any flammable materials near the area while work is going on.



When you are ready to start working, check your equipment before lighting the blowpipe. Be sure all connections are tight and that gas pressure is correct. Never use a greater pressure than is required, because you think you can work faster—you can't! Too much pressure will only waste oxygen and acetylene, and increase the danger of fire by expanding the range and number of sparks.



Respect the Flame

The oxy-acetylene flame can be as destructive as it is constructive if not used as it is intended. For this reason, you can never be too careful when working with a blowpipe. Always protect

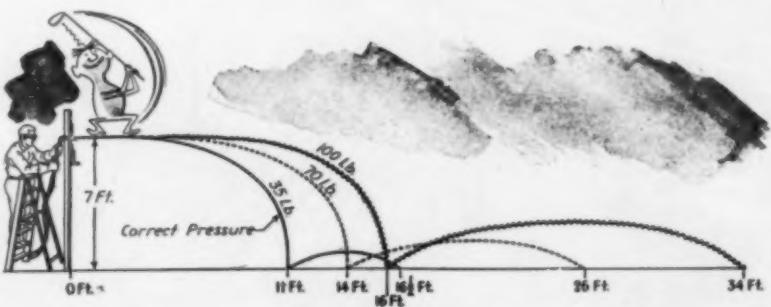
Here are three good practices that will help you control sparks:

1. If you can move your work, set it up in an area that is free from flammable materials.

2. If you can't move the work, move the flammable material or source of danger.

3. If neither can be moved, use guards to keep sparks close within the area of your work. Set pans of water or sand where they will catch dripping slag and pieces of hot metal that might fall.

After you set up sheet metal or asbestos guards, have someone check to see if sparks are flying over or around them. When you change the direction of flame toward the work, the direc-



wooden beams, flooring, partitions and painted surfaces from the blowpipe flame with sheet metal or asbestos guards.

Wear gloves and protective clothing to cover your body. Don't use matches to light your blowpipe; keep a flint lighter with the apparatus.

Control Flying Sparks

Unlike flame, the effects of which are confined to the immediate work area, sparks travel far and fast. For example, a good, fat spark can travel over 30 ft and hold its heat several seconds after landing. Sparks can lodge themselves in cracks and can start smoldering fires which may not break out into flames until you have left the area.

Never weld where sparks may come in contact with flammable vapors, liquids or materials. Sweep floors clean and if they are wood wet them down before you light the blowpipe. Never give sparks the benefit of the doubt. If there is a possibility that they might pass through cracks in walls or floors, cover the holes or move the work. Always take the time to be safe and careful.



tion and range of sparks may change too. Keep this in mind, and make periodic checks to see that you are providing enough protection in the right places.

Make every effort to prevent fires, but be prepared to put them out if they start in spite of your precautions. Keep extinguishers, sand or water near each job so they can be used quickly if needed.

800 TONS PER SHIFT

WITH McCARTHY AUGERS



**SELF-MOVING FROM HOLE TO HOLE WITHOUT TRACTOR
ONLY TWO OPERATORS REQUIRED ON MACHINE
DRILLS ANY SEAM REGARDLESS OF HARDNESS
ADAPTS FOR 30", 36" and 42" AUGERS**

Ford Coal Company, Gilbert, West Virginia, produces high-quality coal from the Cedar Grove seam at a rate of 750 to 800 tons per 10-hour shift with this big McCarthy Coal Recovery Drill. The powerful Models 1400 and 1500 30-36-42 walk from hole to hole—have extremely low maintenance cost... work in tight quarters... just 2 men required.

Equipment cost is important. Get the facts on Salem's 12 McCarthy Models today. Initial investment is less... pit to pit moves are simple and fast... setup is quick. Add it up... augered coal costs less per ton with McCarthy.

THE SALEM TOOL CO.



Performance-Proven

that's the Success Story of
ROCKBESTOS A.V.C.
Motor Lead Cable

standard equipment for heavy-duty mining machinery motors.

Today hundreds and hundreds of motors in heavy-duty mine machinery give continuous trouble-free performance, thanks to Rockbestos A.V.C. Motor Lead Cable.

This Rockbestos cable was designed for use where oil and grease resistance is important, where protection against high ambient temperatures, starting overloads and other operating tortures is of prime importance. And Rockbestos A.V.C. Motor Lead Cable is standard equipment in motors used by leading mining machinery manufacturers such as Goodman, Jeffrey, and Joy.

This Rockbestos cable is also performance-proven in mill motors and other heavy-duty stationary and traction-type motors.

You, too, can get trouble-free wire performance in your motors by specifying and using Rockbestos A.V.C. Motor Lead and Apparatus Cable. It keeps flexibility indefinitely — won't bloom or rot, when exposed to grease — won't burn or carry flame.



Be sure to get this quality cable —
specify Table ML, Rockbestos A.V.C.



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Today's preparation
and handling equipment takes
a giant step to greater
productivity!

and

FAIRMONT
shows the way



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Car retarders and hoists, car shakers, unloaders, rotary-car dumpers, portable conveyors, track hoppers, grizzlies, feeders, weighing devices.

TRANSFER

Skip hoists, bucket elevators, belt and flight conveyors, mass-flow and screw conveyors, stacking conveyors.

PREPARATION

Crushers and breakers, screens and dryers, washing equipment.

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Bins, bunkers and silos, bin flow devices, indicators and alarms, vibrators, gates and valves.

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Conveyors, elevators, chutes, scales, meters and samplers.

Ever changing conditions and demands by industry pinpoint requirements that depend more and more on systems and modern machines geared to the tempo of the age!

Coal, a major industry, is part of this trend to greater productivity and improved quality. Fairmont Machinery, with over 60 years experience, is keenly alert to these rapidly changing times and is making every effort, through research and development, to provide you, the operator, with the most efficient and economical methods for handling, preparation and storage.

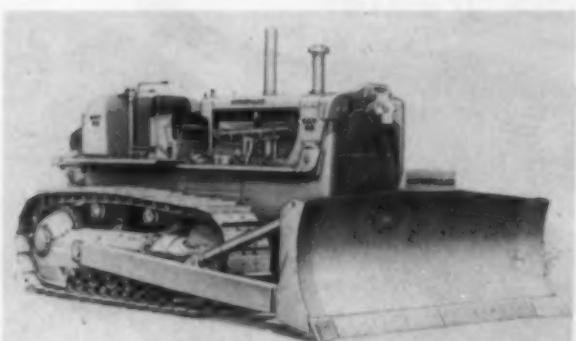
Fairmont is equipped and ready to produce for you—whether a complete preparation or cleaning plant; an entire or partial operating system; or the modernizing of your existing facility.

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ENGINEERS • DESIGNERS • FABRICATORS and CONSTRUCTORS

Equipment Developments



Bigger, More Powerful "Cats"

Two entirely new Caterpillar D8 tractors featuring greater weight and horsepower, plus a new line of matched tools, are products of a 3½-yr development program at Caterpillar Tractor Co., Peoria, Ill. The new Series H D8 machines, direct drive and torque converter, have shown 18 to 24% higher yardage per hour in tests in heavy clay, compared to the previous model.

Weight of the new direct drive D8 is 47,102 lb, an increase of 4,377 lb over the previous model. In the torque converter tractor, the weight increase totals 4,480 lb. The new machines are 9 in longer and 5 in wider than their predecessors and gage has been increased from 78 to 84 in. By using double reduction final drive, Caterpillar engineers have raised ground clearance more than 50% to nearly 20 in on the new units.

Addition of a turbocharger has upped power substantially and torque of the new engines has been raised 20%, resulting in substantially better lugging ability, according to the firm. The undercarriage of the new tractors, designed to provide new high strength and durability, features lifetime lubricated rollers and idlers, being introduced for the first time on the Series H D8. No lubrication is required until the service life of the machine is over, at which time, if rebuilding is desired, rollers and idlers are again lubricated. This major industrial advance is accomplished with completely new face-type metal floating-ring seals and rubber rings, which Caterpillar declares, have proved their performance qualities in 3 million hours of testing.

External changes in the D8 track rollers include an increase of nearly 1 in in rim diameter with more material under the load zone. Steel hubs have replaced cast iron to reduce bell mouthed and cracking. The increased length of the roller, coupled with the retention of bushing-type bearings, distributes tractor weight over greater bearing area. Many other improvements in this new line of heavier tractors are stressed by the manufacturer. Track links will have longer life because of increased height, to ¼ in, and pitch length, to 1 in. Track pin diameter has been upped from 1½ to 2 in resulting in greater strength, and the ends of track bushings are now tempered and beveled on their inner diameters for more durability.

The grouser on the new D8 series is thicker for greater beam strength, and due to increased undercarriage clearances, the new machines will accommodate 28-in track shoes, whereas 26-in shoes were the widest possible on the former model. Also featured is the pressure-lubrication of the entire

power train with completely filtered oil. Engine-type oil (SAE 30) is used to lubricate and cool the transmission, bevel gears and steering clutches. Final drive gears and bearings are pressure lubricated with completely filtered oil by use of a newly-incorporated final drive sump, oil pump and filter. Use of double-reduction final drive gears reduces loads on all components of the power train. Addition of a dry air cleaner results in improved filtration of intake air, reduced maintenance cost due to elimination of oil in the cleaner and a reduction in servicing time of at least 75%, states the firm.

The new transmission on the direct-drive model is directly reversing in all six speeds and top reverse speed is nearly double that available on the previous direct drive model. Also, the new high forward speed has been increased to 6.3 mph from 5.2 mph. A design feature to increase operator comfort and visibility is the mounting of the steering clutch and governor control levers on a console for better accessibility. Operator effort is further reduced by hydraulically-actuated steering clutches and hydraulically boosted flywheel clutch and brakes. A foot decelerator, standard on the torque converter and optional on the direct drive, provides increased and easier maneuverability. Other important highlights are the oil-type fly-wheel clutch, live power to the cable control units and in-seat starting.

To team up with the new tractors' power, Caterpillar has brought out a complete new line of matched tools. Characterized by strength and durability to match the new Series H D8's increased output, the new equipment line includes a complete new family of bulldozers. All three new model blades—straight, angling, and "U" dozer—have been designed for greater production, longer life, and increased ease of servicing and transporting.

No. 8S Bulldozer possesses a modified U-shaped blade, allowing handling of bigger loads because of reduced end-spillage due to angled end sections. The 8S is 9½ in longer than its predecessor. Increased blade rigidity is accomplished by the inclusion of longer diagonal braces, and a two-piece cutting edge is standard, making one-man reversal or replacement of the cutting edge easier.

Bulldozer 8A features a two-piece C-frame, which can be quickly assembled or disassembled for easier shipping. The new blade is 18 in longer than the former model and has stronger construction and blade braces.

Bulldozer 8U, with an 18-in increase in length and 6½ in increase in height, incorporates the new operating and service features of the No. 8A and 8S bulldozers. In addition, gussets are added to support the cutting edge base.

A new No. 8 ripper, with a "five-position" clevis and tooth has also been made available for use on Series H D8 tractors. The redesigned clevis, with three tooth-positioning holes and a tooth which provides a "high" and "low" position, gives this new unit ability to more closely match ripping angles to varying materials. A kick-out mechanism, similar to that used on the current No. 9 ripper, has been incorporated in the new No. 8. This device automatically returns the hydraulic control lever to "hold" position when the hydraulic ram approaches its maximum limit during raising or lower operations. The result is that operator efficiency is increased, and wear is decreased due to bottoming of the hydraulic piston and actuation of the hydraulic-control relief valve.

Three new hydraulic controls are available to operate the new line of D8 tools. They include the No. 176, No. 185

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You get *new speed* and *new safety* with the RBD-30S-579. This roof bolting unit completes the whole bolting cycle from drilling to bolt setting in less than 3 minutes. *New* fully enclosed dual-wheel drive has separate tramping motor with push button control. Gives instant forward . . . stop . . . reverse.

This rig drills holes exactly right in size and direction. No dog-legs! No wobbling! No dwelling! That means safe,

positive bolt installation. *New* stepped-up motor gives you 30% more power for drilling and bolt setting. Built-in clutch slips on overload to prevent stalling.

New built-in cooling fan pulls heat away from enclosed motor, adds life to insulation. RBD-30S-579 furnished with low speed spindle adapter for slow speed drilling and low seam drilling attachment. Available with water swivel attachments. Write for complete details.


Chicago Pneumatic

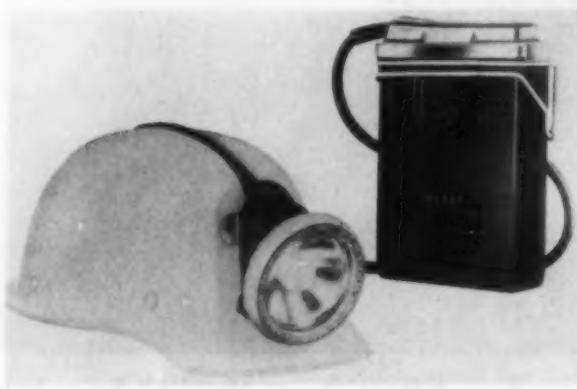
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PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Equipment Developments (Continued)

and No. 143 hydraulic controls. The most notable feature of these units, in addition to their increased size and capacity, is the flexibility of arrangement they offer. The No. 176 control, for example, can replace the No. 46 hydraulic control for bulldozer operations, and at the same time, can replace the No. 48 hydraulic control to operate the ripper and tilt cylinder by addition of fender-mounted auxiliary valves. This versatility eliminates the need for purchasing a separate complete control unit for ripper and tilt cylinder service.

Similarly, the No. 165 replaces the previous No. 48 hydraulic control in actuating the ripper and tilt cylinder and the new No. 143 control replaces the No. 44 hydraulic control for tilt cylinder operation. Increased power and higher response speeds are attributed to these new controls. When operating the dozer and ripper with No. 176, more hydraulic horsepower is available due to a relief valve setting of 1,500 psi as compared to a valve setting of 1,075 to 1,150 psi on the No. 46 control. This feature provides for more positive action of blade, ripper and tilt cylinder when operating in highly resistant material.



Improved Electric Cap Lamp

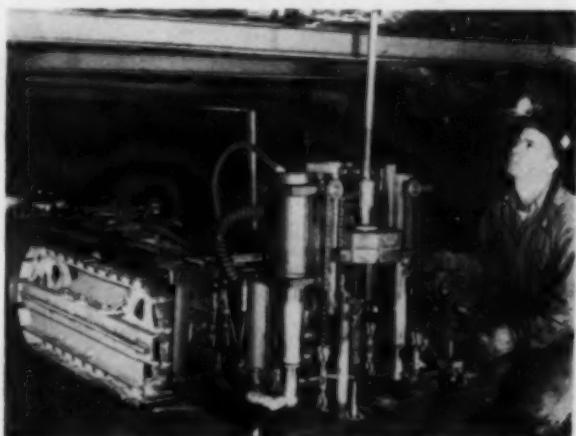
New battery design and krypton gas-filled bulb with two equal-working filaments account for 30% more light from the Wheat "National" electric cap lamp, reports National Mine Service Co., distributor for the producer, Koehler Mfg. Co., Marlboro, Mass. Easily focused without tools by turning a switch knob that effects a crossing and centering of the filaments on the long axis of the bulb, the lamp produces a perfect spot, states Mine Service. The new-type battery, said to be more highly resistant to vibration and hard use, has a double-sleeve multtube positive-plate construction permitting more active material per tube and greater accessibility of electrolyte to material. In addition, the cord now passes over the crown of the protective cap for better balance.



No-Screw Bit Block

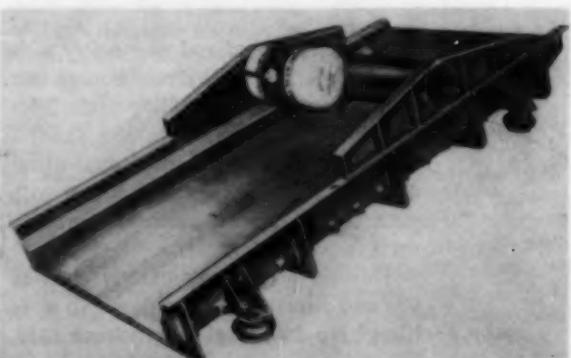
Working on a taper holding principle, a new bit block for augers and automatic miners is said by Compton, Inc., Clarksburg, W. Va., to eliminate set screws. The block, made of

a special nonabrasive alloy steel, holds the bit rigid and tight with no chance of tilting or side motion, reports Compton. It is interchangeable, therefore not needing a right or left style, and comes in three model sizes, all designed to hold a spiral pin. Even welding of the bit holder to the cutting member that often causes distortion does not affect the gripping power of the new block, adds the firm.



Bolting Machine Collects Dust

A hydraulic roof drill machine on crawlers, with a built-in dust-collecting system, is new from Schroeder Bros. Corp., McKees Rocks, Pa. The "RoofCat," approved by the Bureau of Mines, maneuvers with dual controls which operate the crawlers together or independently. Tramming speeds run from an inching crawl up to 175 ft per min. The machine will eat dust with either of two approved systems—the conventional vacuum cup or the new "thru-steel" type. In the latter method dust is sucked into the opening of the hollow steel auger as the bit penetrates the roof, and is carried through heavy rubber tubing to a collector at the machine's rear section. The RoofCat measures 23 in high, 36 in wide and 102 in long. It has an operating feed length from 22 in up, depending on roof height.



New Vibrating Screen

For dry or wet screening of bulk materials a new "unbalanced motor" electromechanical vibrating screen may be obtained from Syntron Co., Homer City, Pa. The screen handles most materials from 100 mesh to 3-in lumps and comes in

B.F.Goodrich



Traction Express tires give coal hauler up to 90,000 miles before retreading

THAT hopper-bottom trailer has just emerged from a coal-loading tunnel at Guntersville, Ala., ready for the 75-mile trip to Rome, Ga. It's one of a fleet owned by the Coal Transportation Co. that works 18 hours a day, 6 days a week, hauling 20-ton loads over winding, mountainous roads.

"We have a hauling job that is particularly hard on tires," says President Taft Chatham, "but we find B.F.Goodrich Traction Express tires give better service than any other make we have ever used!" Traction Express tires give this company up to 90,000 original miles—then 2 retreads! Blowouts and tread separations are almost unknown!

Like all B.F.Goodrich tires for mine

work, the Traction Express is built with a FLEX-RITE NYLON cord body. B.F.Goodrich FLEX-RITE NYLON withstands double the impact of ordinary cord materials, resists heat blowouts and flex breaks. No wonder this B.F.Goodrich construction outwears even the extra-thick Traction Express tread, can often be retreaded again and again.

See your B.F.Goodrich Smileage dealer today. He has B.F.Goodrich tires for your mining jobs that will save you money, give you longer service. Your dealer is listed under Tires in the Yellow Pages of your phone book. *B.F.Goodrich Tire Co., A Division of The B.F.Goodrich Co., Akron 18, Ohio.*

Specify B.F.Goodrich Tubeless or tube-type tires when ordering new equipment



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B.F.Goodrich *truck tires*

Equipment Developments (Continued)

two models: the SS-140, with a 4x6-ft screen surface; and the SS-1510, with a 10-ft screen surface. Both models come as single or double-deck screens with either 900 or 1,800 rpm drives. They can be base or suspension mounted, either way using newly developed pneumatic vibration-absorbing mounting members, which prevent transmission of vibration to other structures, according to the firm. Motors have a thermal overload starting switch and operate on 220 or 440 V, three-phases, 60 cycle, AC.



Quieter Car Shaker

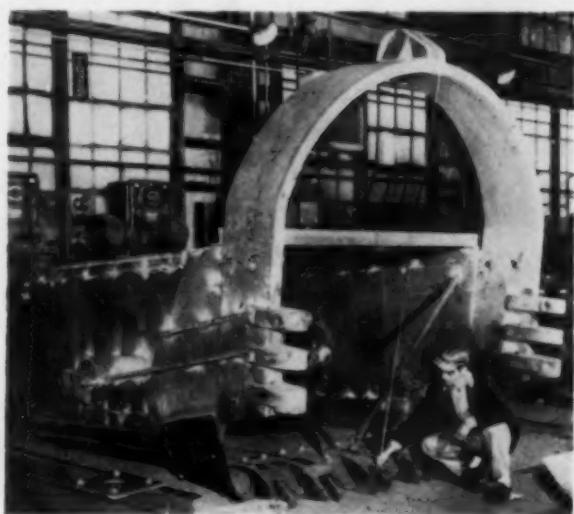
Top efficiency with less noise in unloading hopper-bottom rail cars are credited to "Carquake," new hydraulically powered car shaker from Stephens-Adamson Mfg. Co., Aurora, Ill. With a clamping feature by which the shaker becomes an integral part of each car structure, noise from bouncing and hammering is virtually eliminated, the firm states. One man can quickly and easily unload cars, controlling the process from a hydraulic control panel free from danger of cave-ins or accidental falls through car bottom openings. There are two models: Type "B," stationary mounted, where only slight movement parallel to hopper cars and track is required; and Type "C," mounted on rails and propelled with a hydraulic motor up to 50 fpm.



New Payloader

Frank G. Hough Co., Libertyville, Ill., announces that it will replace the Model HF Payloader with the new H-30R model. The new machine carries up to 3,000 lb at average

operating speeds and has rear-wheel-drive with front-wheel steering. Buckets from $\frac{1}{2}$ to 2 cu yd are offered, reports the manufacturer, who notes that bucket action of the H-30R provides full 40 deg tipback enabling the operator to obtain larger loads than possible with the old model. Powered by a six-cylinder Hercules gasoline engine, the new Payloader has a torque converter with 2.6 to 1 stall ratio and a four-speed full-reversing manually-shifted transmission.



Rugged Dragline Buckets

Light weight, high strength and durability are features attributed to new dragline buckets made by the Sullivan Trail Mfg. Co., W. Pittston, Pa. Resulting from the need for tough buckets in strip mining in anthracite fields around Wilkes-Barre, Pa., these buckets are said to derive their ruggedness from special alloy steels. Jalloy and Jalten supplied by Jones & Laughlin Steel Corp., Pittsburgh, Pa. Jalloy, heat-treated for maximum abrasion and impact resistance, is used in areas of the bucket subject to greatest stress and abrasion, such as, the arch, jaws, back, bottom and bottom skids. Jalten, light but strong, goes into the sides, and sections not exposed to so high a degree of abrasion. With this combination, reports J&L, 30% longer life is attained, as well as savings of several thousand pounds compared to competitive buckets in the 6-, 9-, 10- and 12-cu yd sizes.

Speed Coal Flow

A device to regulate the outflow of coal and other bulk solids from gravity bins and silos up to 7,000 lb per minute is offered by the Fairmont Machinery Co., Fairmont, W. Va. Called Easy-Flo Bin Device, it can operate with conveyors and feeders, automatically maintaining material in an unpacked state by means of a stainless steel double-cone element that is the heart of the device. Its outer shell is carbon steel. A low-pressure discharge outlet eliminates heavy-duty gates and similar cut-off equipment. According to the firm, tests reveal that the Easy-Flo-Bin device protects against dangers of rat-holing, arching and funneling of the solids within the bin.

(continued on p 154)

TO MEET THE EXACTING DEMANDS OF FUTURE MARKETS

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In fact, it is evident that more and more Coal Preparation Men recognize the outstanding operating records of H & P designed Coal Cleaning Plants.

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Announcing 3 NEW CARMET Mine-Tested Cutter Bits

Here's a trio of precision-made cutter bits, proven in operation to give long service under tough mining conditions. Your Carmet distributor carries them, and cutter bits for every mining operation, in stock. Check with him now.

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Revised 5th edition contains application data and specs on full Carmet Mining Tool line, including sections on grinding and reconditioning. For your copy, see your distributor or write Carmet Division, Allegheny Ludlum Steel Corp., Detroit 20, Michigan.

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Carmet JC Style Colmol and Boring Bit

Note the collar support that prevents bit block from splitting. Shank is forged from high-alloy heat-treated steel. Tough, hard, wear-resistant carbide tip is double-bonded by mechanical cap. Long operating life under all conditions.



Carmet JR Style Cylindrical Bit

Another new outstanding Carmet bit for use on all cutting machines and continuous miners. Tip is embossed in high alloy heat-treated steel.



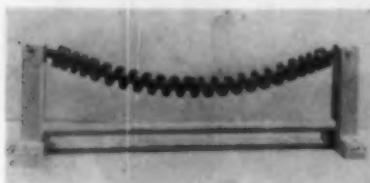
Carmet GV Style Bit for Joy Cutter Chain

Designed with husky bull-neck for use on Joy GV-6111 cutter chain. Style GVR has drilled carbide insert brazed into shank for maximum support. GV series available with double-bonded insert brazed to milled shank.

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Equipment News (Continued)



Spiral Rubber Idler

For most types of belt conveyors, a new spiral-shaped rubber idler offers numerous benefits, declares the manufacturer, Hewitt-Robins, Inc., Stamford, Conn. Flexible because it is constructed of rubber molded around wire rope, the idler carries conveyor belts smoothly under heavy or light loads. Features noted by the company include: smaller diameter and lighter weight than conventional metal idlers; self-cleaning by constant flexing from end-to-end; flexibility enabling it to conform to belt load resulting in uniform operation; easy replacement by lifting out worn idler and dropping in new one without removing bolts, frames or other holding devices; torsional strength from continuous rubber spiral design insuring long life. The idlers, priced from \$35 to \$45, will be available for belt widths of 18, 24, 30 and 36 in.



New Thermal Switch

Tiny contactless thermal switches whose resistance increases abruptly when a specified desired temperature is attained have been developed by the Materials Engineering Laboratory of Westinghouse Electric Corp., Pittsburgh, Pa. First application will be for over-temperature protection of hermetic motors. This protective system, named "Guardistor," will consist of the tiny

thermistors installed directly in the motor windings of totally enclosed motors, to which the method is particularly applicable. The tiny pill-like objects will de-energize the motor with a small external relay or give a signal when overheating takes place.



Poisoning Test

Two quick ways of testing for carbon monoxide poisoning are possible with a new CO Poisoning Test Kit, reports the manufacturer, Mine Safety Appliances Co., Pittsburgh, Pa. The MSA kit pro-

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Engineered for rugged use in the field. Low initial cost, no maintenance. Can be used as PITLESS SCALE saves on pit costs.

CAPACITIES: 20 to 52 tons. DECK LENGTHS 18 to 43 ft.

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156 N. 5th St. Dept P1 Columbus, Ohio

NEW CHEVROLET 4-WHEEL DRIVE ENABLES YOU TO HAUL WHERE YOU COULDN'T BEFORE!



Model 3685 Fleetside Pickup

Chevrolet's new 4-wheel drive really digs in and does it . . . enables you to haul through deep mud, snow, swampy areas and up towering grades. With up to twice the traction, wheels are able to grab hold and go!

Here's the latest thing in 4-wheel drives! A rubber-mounted power divider with precision-engineered front axle distributes power evenly to front and rear axles. And when the going is extremely difficult, it directs power to whichever axle is getting the best traction. Result: Your load goes through, whether the road does or not!



EASY SINGLE-STICK CONTROL

Shifting between 2-wheel drive and 4-wheel drive can be done whether the truck is stopped or moving. Lever has these 4 positions: (a) 4-wheel drive, (b) neutral, (c) 2-wheel direct, (d) 4-wheel direct.

CHEVROLET 4-WHEEL DRIVE SUITS MANY MODELS

There are Chevrolet 4-wheel drive pickups for ploughing, grading, snow removal jobs, and others . . . panels for surveying, delivery, and construction tasks . . . Suburban Carryalls for sportsmen and tough cargo-and-passenger-carrying jobs . . . stakes for work that calls for heavy back-country hauling . . . and chassis-cabs for a broad range of special applications!

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With four power takeoff outlets, Chevrolet 4-wheel drive can be used to operate saws, winches, generators, pneumatic hammers, post-hole diggers, back hoes, and many more!

Get complete information on new Chevrolet 4-wheel drive!

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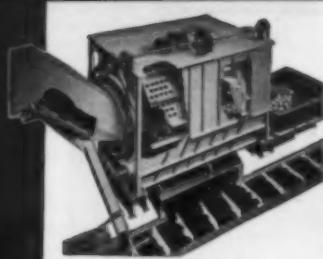
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See your nearby Chevrolet dealer about versatile 4-wheel drive in

CHEVROLET TASK-FORCE 59 TRUCKS

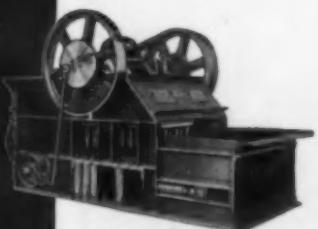


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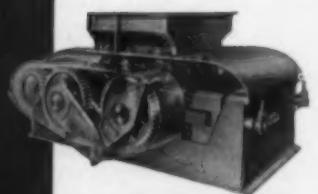
**McNally Pittsburg
Rotary Breaker**

This unit allows positive control of top size in handling run-of-mine washery feed. Production of fines is held to a minimum.



**McNally Norton Vertical
Pick Breaker**

50% Less fines when reducing lump to egg and stove sizes.



**McNally Double Roll
Gearmatic ROM Breaker**

Built in tonnage ranges from 750 tph to 1400 tph. Full floating gearmatic drive.



**McNally Gearmatic Stoker
Coal Crusher**

This unit offers three prime advantages: high volume production, plus accurate sifting, plus low percentage of fines.

Available From Stock and on Short Delivery
For immediate action on complete information write,
wire, or call.

McNALLY PITTSBURG MFG. CORP.

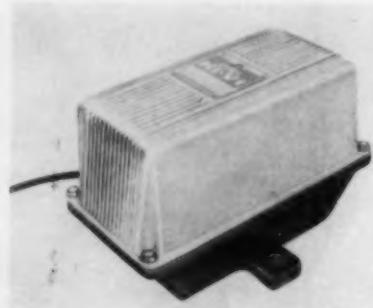
Pittsburg, Kansas

Wellston, Ohio

Equipment News (Continued)

vides a test for either exhaled air or a blood sample. A color change is produced in a tube of silica gel impregnated with a yellow complex silicomolybdate compound catalyzed with palladium sulfate. The color is compared with a color chart to determine the percent of CO in the body.

lector has separated by weight 99.8% of steel grindings, 99.5% of sawdust and 84% of fine-corn starch particles. Besides the radial fan, other design features are long tapering cone design, high inlet velocities and fan location on clean air side to eliminate damage from heavy material being separated.

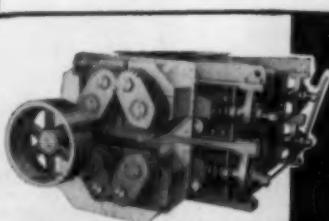


Bin Vibrators

Eriez Mfg. Co., Erie, Pa., announces two new vibrators, V3B-40P and V3B-40S for bins, chutes and hoppers with wall thickness not more than $\frac{1}{16}$ in and about 20 cu ft capacity. V3B-40P is specially built for impact, pinpointing powerful vibrations to assure steady flow of granular, lumpy or powdered material, while V3B-40S is similar but semi-noiseless and designed specially for installation in hazardous, dusty locations. Eriez's vibration-producing element is a cast aluminum armature in which are embedded Alnico V permanent magnets and soft-iron pole pieces to give efficient performance, says the firm. The unit works directly from either 50- or 60-cycle AC with no change in components.

Dust Collector

A new cyclone separator in the 2,000 to 3,000 cfm range has been announced by Torit Mfg. Co., St. Paul, Minn. Model No. 24, for large volumes of dust, has self-cleaning radial-fan design providing top performance at low horsepower, declares Torit. In tests the col-



McNally Two Stage Crusher
This unit consists of a double roll primary crusher mounted above a double roll secondary crusher—compactly arranged into a single rigid structure.

Closed-Circuit TV

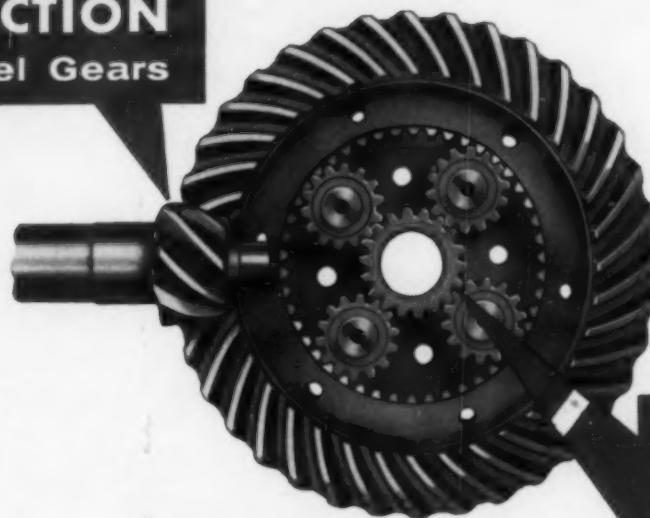
Closed-circuit television cameras which adjust to changing light levels are new from General Electric Co., Electronics Park, Syracuse, N. Y. Designated TE-6-B and TG-2-B, the cameras use a regulated target voltage to maintain a uniform output-signal level over light changes greater than 150 to 1. Accessories make possible remote aiming of the camera at distances up to 1 mi, according to the firm.

Lifetime Lubrication

Lifetime-lubricated track rollers, carrier rollers and idlers are now available in the model D-9 tractor, reports the Caterpillar Tractor Co., Peoria, Ill. Floating ring seals with metal-to-metal sealing surfaces eliminate field lubrication, rewarding users with increased machine use, lower maintenance costs and other savings, Caterpillar states. Other improvements noted are: more rugged sleeve bearing design for built-in

A New Concept in Double Reduction Truck Axles

**FIRST
REDUCTION**
in Bevel Gears



**SECOND
REDUCTION**
in Planetary

Eaton Planetary Double Reduction

Gives You these Important Benefits!

Save Weight

—Size for size, Eaton PDR Axles weigh less than conventional herringbone or spur gear axles, permit truckers to haul more legal payload.

Last Longer

—In Eaton PDR Axles, gear tooth loads are equally distributed over four rugged "planet" gears; stress and wear are reduced, resulting in materially longer axle life. Eaton's forced-flow lubricating system provides positive lubrication to all moving parts, even at slowest vehicle speeds—a feature not available in other double reduction axles.

Cost Less to Maintain

—When and if repairs are necessary, parts are readily available—most of them interchangeable with other Eaton Axles. Simple construction—similar to the famous Eaton 2-Speed Axle, with which all truck service men are familiar—holds maintenance labor to a minimum.

Previously, double-reduction axles have been available only in the extra heavy-duty sizes. Eaton PDR Axles are available in a wide range of sizes—the last word in equipment to meet the demands of today's hauling conditions. By actual comparison they cost less to buy, less to maintain. They have established outstanding performance records in all types of heavy-duty operation.



Ask your Truck Dealer for
Complete Information about
Eaton PDR Axles

EATON

AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND, OHIO



Lima Type 2400 with 120' boom and 6½-cu. yd. bucket owned by Miller & McKnight Coal Co., Slippery Rock, Pa., working near Harlansburg, Pa.

Big output, Low maintenance is story of LIMA Type 2400 on rugged stripping operation

"Our Lima 2400 does more work and costs less to maintain than other makes of similar capacity." That is what Calvin McKnight, Miller & McKnight Coal Company partner, says about the Lima Type 2400.

Moves more dirt

"Maintenance certainly hasn't been any problem. Hardly any downtime to speak of. Fact is, we figure that in about 6000 hours of rugged stripping operations, maintenance and parts costs have amounted to less than \$300. Or less than a nickel an hour!"

"Our 2400 moves more dirt than any

machine I know of around here. And it is built better, too. Clutches and brakes—all are extra big—last longer. They're made to take it. Seems as if you just can't wear a Lima out!"

Standard Lima Type 2400 is a convertible 6-cu. yd. shovel, 110-ton crane and variable capacity dragline. Longer booms and handles can be added for high lift shovel work. Built throughout for heavy duty service where big production, rugged power and low operating cost are vital.

Faster swing motion

The 2400 is a full mechanical clutch

machine with all major operations accomplished by air actuated clutches. Diesel engine equipped with torque converter to reduce shock loading and eliminate engine stall. Converter gives operator smoother, more accurate control of all operations.

No matter what your job requirements, if it calls for high performance at low cost, there's a Lima type and size exactly right for you. Cranes to 110 tons, shovels $\frac{1}{2}$ to 6 cu. yd., draglines variable. Choice of mountings and power plants. Get more information now. See your Lima distributor or write to us.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

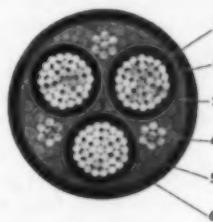
LIMA Construction Equipment Division, Lima, Ohio
BALDWIN • LIMA • HAMILTON

Shovels • Cranes • Draglines • Pullshovels • Roadpackers • Crushing, Screening and Washing Equipment





How to plan a money-saving mine substation installation



1. Power Conductor. ASTM Class B stranded, annealed bare copper (aluminum conductors also available), shielded with a semi-conducting tape.

2. Insulation. Rolene (polyethylene), complies with IPCEA and ASTM standards—suitable for maximum continuous conductor temperature of 75°C.

3. Electrostatic Shielding. Bare copper shielding tape over semi-conducting bedding tape on each insulated conductor.

4. Grounding Conductors. ASTM Class B stranded bare copper—one grounding conductor in each interface in direct contact with electrostatic shielding.

5. Assembly. Three shielded power conductors cabled with fillers and grounding conductors.

6. Jacket. Rome Roseal, special black flame-resistant polyethylene, over the cabled and taped assembly—excellent mechanical and electrical properties.

You'll save money on mine substation installations if you use Rome's MPT in place of conventional rubber and neoprene cable wherever you have a power supply system that's designed for relatively steady loads and protected against excessive overloading.

Here are four ways you can lower your mine substation costs:

1. You pay less to start. For instance, in the case of size 2 AWG 3-conductor 5 KV cable, Rome's MPT costs about 28% less than rubber-insulated and neoprene-sheathed cable.

2. Reduce handling costs. Rome's MPT is lighter in weight—so it's easier to work with. You can use smaller fittings because diameters are smaller. When you have to relocate a cable, you can do it much more easily with lightweight MPT.

3. Get longer suspensions. You reduce strain on supporting members when cable is end-suspended in boreholes or aerially-suspended—because

over-all weight is down as much as one-third. When conductors are supporting members in end-suspended borehole applications, lightweight Rome MPT gives you 33% longer suspensions than conventional cable.

4. Cut replacement costs. Get exceptionally high resistance to acids, oils, moisture, abrasion, heat and mechanical damage—thanks to Rome's MPT Rolene (polyethylene) insulation together with Roseal (flame-retardant polyethylene) jacket.

In addition to low-cost borehole installations, you can economically use Rome MPT in shafts, or horizontal runs in underground entries. It may be buried in a trench or suspended on insulators.

Rome's MPT Power Feeder Cable comes in sizes 6 AWG to 250 MCM, 3-conductor, rated to 5000 volts and higher. Contact your nearest Rome Cable distributor for full particulars—or write Department 511, Rome Cable Corporation, Rome, New York.

ROME CABLE
CORPORATION

It has a tapered slot. A NEW IDEA IN PREPARATION SCREENS. the Wedge-Wire *TAPER-SLOT*

designed to eliminate blinding when screening large amounts of near-opening size materials

From loop to loop, the opening or slot gradually increases in width. This new design enables materials that would normally lodge in the wires to be bypassed, with flow of the most to the larger opening at the rear that at all points the material either passes through the screen or bypasses it. In addition, the "dip" created by Wedge-Wire loop construction, forces abrasive materials and allows them to continue on with the material flow. These factors are responsible for the high efficiency of the TAPER-SLOT screen.

The new TAPER-SLOT can be easily interchanged with other types of Wedge-Wire screens. Available in all standard Wedge-Wire materials.

.024 DIP .016 .024 DIP .016 .024 DIP .016

LOOP LOOP LOOP

WEDGE WIRE CORPORATION
Wellington, Ohio

Equipment News (Continued)

shock-absorbing ability; through-hardened shafts with increased diameter for greater beam strength; end collars locked in place with snap rings for easy assembly and disassembly; and a steel track-roller hub instead of the former cast-iron type to extend service life. Caterpillar concludes that these tractors, extensively tested in Minnesota taconite mining, clearing swamps, pushloading and ripping coal in Pennsylvania, present a "significant forward step in the progress of heavy machinery."



Hard-Facing Spray

Hard facing with sprayed tungsten carbide at very high deposit efficiency is now possible with a powder material developed by Metallizing Engineering Co., Inc., Westbury, N. Y. Coating rates as high as 110 to 150 sq ft per hr, 0.001 in. thick, are possible with close control of coating thickness, reports the firm. The special substance is sprayed on with the Metco "ThermoSpray" gun and then torch-fused to diamond hardness.

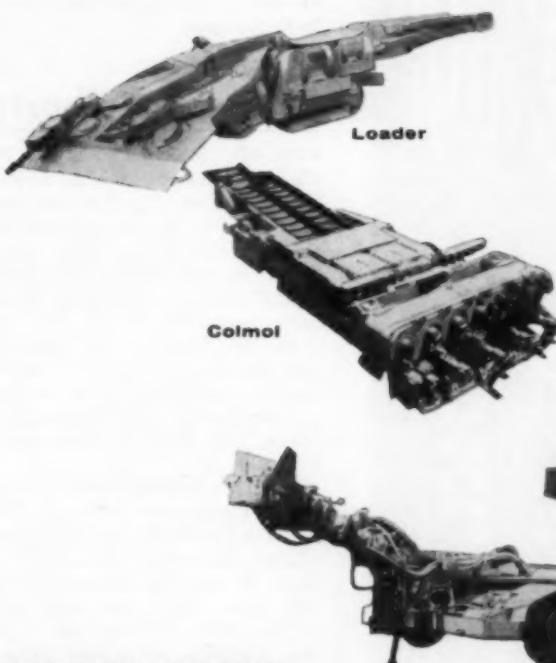
Rugged Fire Hose

Soak it in mud holes, hang it in the darkest mine for months, run a truck over it, but you won't hurt it—this is the report B. F. Goodrich Industrial Products Co., Akron, Ohio, makes on its new "Imperial" hose after battering it with such punishing tests. The tough hose, with an all-Dacron jacket, was originally designed for heavy-duty service in oil refineries and chemical plants but is now recommended for the mining industry because of its tenacious qualities. According to the manufacturer, it outlasts conventional single-jacket hose seven to one and rubber-covered hose three to one. Resistant to mildew, oils, acids, hydrocarbons and abrasion, it will withstand surge pressures far beyond its initial 500-psi pressure test range, reports the firm. Hose is available in 1-1/2-, 2- and 2-1/2-in diameters.

Rubber-To-Metal Pump

Positive displacement pumps with rubber-to-metal design are produced by Goodyear Pumps, Inc., Rockefeller

AC-POWERED COAL MINE... CONTINUOUS OR CONVENTIONAL WITH JEFFREY EQUIPMENT



Alternating current power, with its many operating advantages, can now be employed throughout the electrified mine. All Jeffrey machinery, from cutting at the working face to the main belt carrying coal above ground, can be powered by AC as well as DC.

Production goes up with Jeffrey machinery in your mine. Maintenance is low. The reason . . . 80 years of world-wide experience applied to the development of mining and materials-handling equipment.

SPECIFY JEFFREY...

LOADERS, fast and easily maneuvered, to cut your coal production costs.

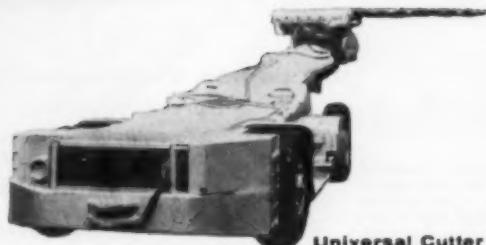
COLMOLS for high tonnage production.

SHUTTLE CARS, matched to your mining height, to insure maximum loads.

ROOF AND FACE DRILLS to increase speed and safety of these operations.

UNIVERSAL CUTTERS to handle any kind of cut, any place in the seam.

Let a Jeffrey engineer show you how to reduce costs with Jeffrey mining machinery and handling equipment. Call our nearest office. The Jeffrey Manufacturing Company, 912 North Fourth Street, Columbus 16, Ohio.



CONVEYING • PROCESSING • MINING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

*these Quality Replacement Screens
keep output high, costs low...*



Be specific. Order wire screens by name.

Durability, quality, accuracy vary widely!

Ludlow-Saylor Screens insure precision and uniformity in meeting critical product specifications...

- won't bog down the plant with re-circulating loads that properly woven screens would have removed in the first pass...
- speed up the usual sluggish movement of feed across improperly woven screens...
- correct variations in crushing characteristics of raw material...
- cut frequent screen replacements, downtime and maintenance

Get better production from your investment in sizing equipment—insist on Ludlow-Saylor Screens.

Immediate Shipment of most weaves and sizes

LUDLOW-SAYLOR WIRE CLOTH CO.

609 S. NEWSTEAD AVE.
ST. LOUIS 10, MO.

SALES OFFICES: BIRMINGHAM, 1727-8th Ave. N. • CHICAGO, 6261 W. Grand Ave. • PITTSBURGH, Union Trust Bldg. • HOUSTON, 5638 Harvey Wilson Drive • DENVER, 1530 Carr St. • LOS ANGELES, Star Wire Screen & Iron Works, Inc. (Ludlow-Saylor Subsidiary), 2515 San Fernando Road.

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Equipment News (Continued)

Plaza, New York 20, N. Y. These pumps, which have rubber bonded to metal inserts for more strength and resilience than metal-to-metal positive displacement pumps, are said to be self-priming and to offer suction lifts up to 30 ft—this at speeds between 750 and 3,000 rpm. They reportedly maintain reasonable constant capacity at any given speed within these margins at pressures up to 100 psi. Goodyear calls their rubber-to-metal design an important development in handling corrosive and abrasive liquids particularly because the only lubricating medium is the liquid being pumped.

Equipment Shorts

FORGED SHEAVE BLOCK—Forged alloy steel construction of all major parts except the wheel and a new opening mechanism are features of a new line of sheave blocks by Joy Mfg. Co., Pittsburgh, Pa. The blocks, available in 6-, 8- and 10-in sizes, are rugged, the forged parts providing strength to prevent shattering, cracking and springing of side plates, according to Joy. The blocks open by turning the hook 90 deg and pushing it aside, eliminating toggle pins, chains, bolts, nuts or cotter pins.

ROTARY COMPRESSOR—Improved rotary compressors with new "Perma-Vane" rotor blades are announced by Davey Compressor Co., Kent, Ohio. Made of special solid lightweight material, these blades are said to have greater wear resistance and to reduce the possibility of serious compressor damage because of freedom from deterioration and breakage. The new line of compressors provides displacements of 8 to 650 cfm. Units come in 2- to 125-hp sizes.

NEW ENGINE—A new four-cylinder gasoline engine for its Model D Motor Grader has been announced by Allis-Chalmers Mfg. Co., Tractor Group, Milwaukee, Wis. It provides 58 hp at 1,650 rpm, best in horsepower among motor graders in the 8,800-lb class, according to the firm. Full horsepower at low engine speed and a high 7:25:1 compression ratio give added horsepower and efficiency, adds the company.

AIR CLEANER—A new air cleaner for its D9 tractors is offered by the Caterpillar Tractor Co., Peoria, Ill. The unit removes 99.8% of all dirt from the diesel's intake air, is fully effective at any speed and is easily and speedily serviced, states the company. A collection cup at the bottom of the unit normally needs servicing once each day. Featured is two-stage dirt removal by a

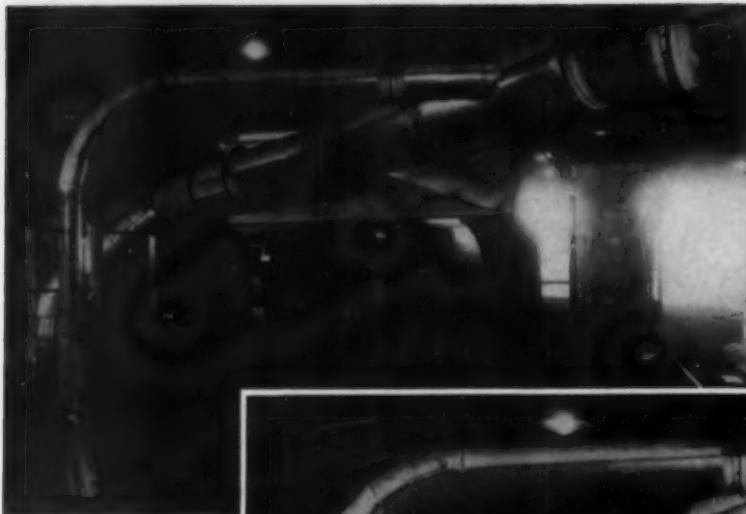


"I call Bethlehem, when I need track bolts fast. They carry a wide variety of sizes in stock, ready to go at a moment's notice."

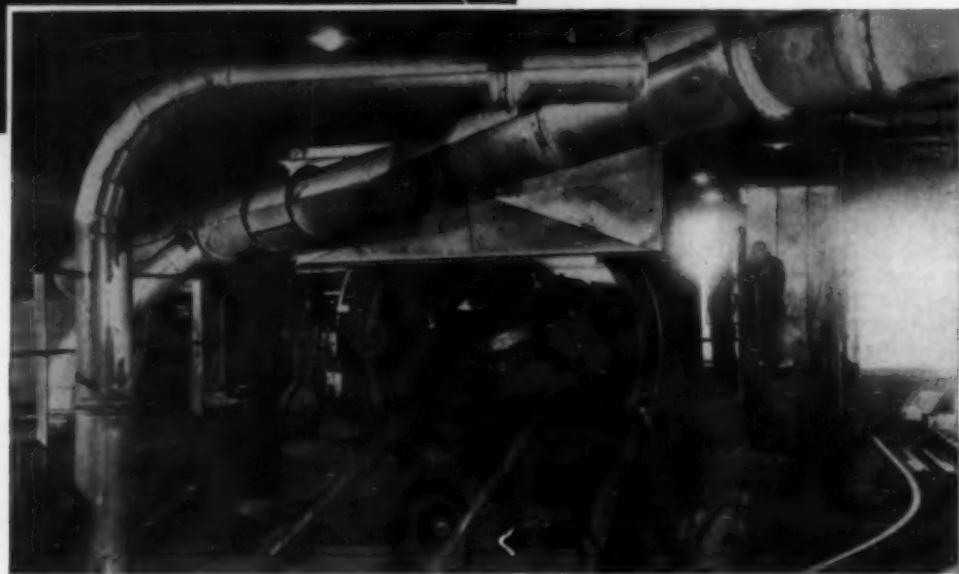
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation





BEFORE: Inside the dump house before turning on the Joy Microdyne. Unretouched photo shows how dust laden air creates a choking haze.



WW E 7481-884

JOY MICRODYNE DUST COLLECTOR GIVES CLEAN AIR...EVEN IN COAL DUMP

A large coal mine had a serious dust problem. Coal dust from a rotary car dump would fill the air in the building in which the equipment was housed. Over a period of two shifts, so much dust would settle that the conveyor equipment under the dump would clog with dust. A maintenance man would spend most of the third shift with shovel and broom to clear the accumulated dust.

After a 32,000 cfm Joy Microdyne dust collector was installed, maintenance was reduced to a general once-a-week clean-

ing. By mounting the Microdyne halfway between the car dump and a large crusher house, and connecting them with stainless steel tubing, the one dust collector serves both buildings.

The Joy Microdyne is a new kind of dust collector, 1/10 to 1/20 the size of any other collector. It is extremely efficient and simple to install and is especially suited for conditions encountered in mining.

If your operation has a dust problem, why not talk to a Joy engineer.



AIR MOVING EQUIPMENT FOR ALL INDUSTRY



JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company
(Canada) Limited, Galt, Ontario

Low labor and handling costs . . .
Efficient, maintenance-free service



PORABLE PIPING of ALCOA ALUMINUM

**for temporary water supply or drainage .
compressed air • steam • fuel**

When your piping services call for lines that must be installed or moved frequently, portable piping of ALCOA® Aluminum is your best bet. Here's why:

It's portable—More aluminum pipe can be carried per truck. Fewer trucks are needed for every job. Each workman easily can handle several standard lengths of aluminum pipe at one time. Large quantities of pipe can be laid by small crews in a minimum number of man-hours.

It's economical—Low labor and handling costs, added to its long service life, make ALCOA Aluminum Pipe less expensive than other piping on an installed cost-per-foot basis.

It's strong and durable—Thin walled ALCOA Aluminum Pipe has very good mechanical properties. Properly used, it will handle adequately most pressures encountered in temporary lines. It provides good resistance to mechanical damage. And the excellent natural corrosion resistance of aluminum eliminates costly maintenance and replacement under severely corrosive operating conditions.

ALCOA Aluminum Pipe and quick couplings of aluminum are available through most major pipe supply companies. You'll find the one nearest you listed in the Yellow Pages of your telephone directory. Your local distributor can furnish you with detailed literature containing complete specification data on ALCOA Aluminum Pipe. Or, you can obtain that literature by writing ALUMINUM COMPANY OF AMERICA, 890-B Alcoa Building, Pittsburgh 19, Pa.



For exciting drama watch
"Alcos Theatre," alternate Mondays,
NBC-TV, and "Alcos Presents,"
every Tuesday, ABC-TV.

With industry everywhere



the No. 1 choice is the V-belt with concave sides

It is easy to see why concave sides insure far longer belt life...and make Gates V-Belts the first choice of industry everywhere.

Just make this simple test: bend a Gates V-Belt as if it were going around a sheave. Feel how the concave sides (Fig. 1) fill out...become perfectly straight (Fig. 1-A).

Note how this belt thus makes full contact with the sides of a sheave...grips the sheave evenly, distributing wear uniformly across the sides of the belt. Uniform wear lengthens belt life—keeps costs down.

With a straight-sided belt (Fig. 2) the sides *bulge out* when the belt is bent, and wear is concentrated on the bulge (Fig. 2-A). Uneven wear shortens belt life—increases belt costs.

Because Gates V-Belts with concave sides are so universally preferred, they are also the *most widely available*. There are Gates Distributor stocks in industrial centers throughout the world.

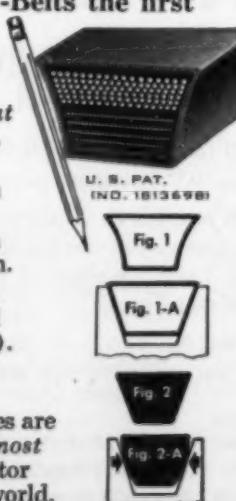
The Gates Rubber Company, Denver, Colorado



World's Largest Maker of V-Belts

Gates VULCO ROPE Drives

TPA 381



Equipment News (Continued)

multicyclone pre-cleaner and disposable resin-impregnated cellulose filter.

TRUCK CRANE—Heavy lifts up to 60,000 lb when working at a 15-ft radius is an important feature of new Model 330 truck crane by Koehring Co., Milwaukee 16, Wis. Boom jibs 15, 20, 25 and 30 ft long can be added to a maximum 120 ft of boom for high lifts, states the firm. Total weight of the crane with a 30-ft-boom is 67,830 lb. The truck has a six-cylinder 214-hp gasoline engine with eight speeds forward, four in main and two in auxiliary.

NEW PIPE FITTINGS—Schedule 5 and 10 grooved stainless steel pipe fittings just brought out by Victaulic Co. of America, Elizabeth, N. J., for installation with Victaulic couplings make possible complete quick-coupled all-stainless-steel piping systems. The new fittings are made from AISI Types 304 and 304L austenitic 18-18 chromium-nickel stainless alloy. They use a gasket to bridge the pipe ends and a housing that fits snugly into circumferential grooves in the piping, and then is made tight with two bolts, or a special toggle that opens or closes by hand.

IMMersed CONTACTORS—For applications from 2,000 to 4,800 V, a new heavy duty oil-immersed contactor, Type 426, has been introduced by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. The 400-amp contactor with 50,000-kva interrupting ratings for either 2.5 or 4.8 kv is the first unit of its kind in the reduced size, according to the manufacturer. It is designed to handle 2,500-hp squirrel-cage motors at 4,800 V and unity-power-factor synchronous motors up to 3,000 hp, 4,800 V.

Free Bulletins

MP FLOMAX PUMPS—Four-page bulletin from Marine Products Co. pertains to pumps for strip mining. Contains illustration of use of self-contained engine driven self-priming pumps. Performance data in gallons per minute as well as weights and prices of complete line are provided. Ask for Bulletin No. 1002, Marine Products Co., 515 Lycaste Ave., Detroit, Mich.

COAL STOKERS—A 12-p booklet with information on the Series 401 pneumatic spreader coal stokers has been reissued by Iron Fireman. Stokers automatically meter, dry, preheat, convey and fire all sizes of coal from dust to 2-in top sizes and all grades from lignite to best bituminous, according to firm. Booklet No. 2530, with cutaway views, installa-

the ONE

you can count on...



HENDRIX
Heavy Duty **Mining Buckets**

4½ to 14 Cubic Yards With or Without Perforations

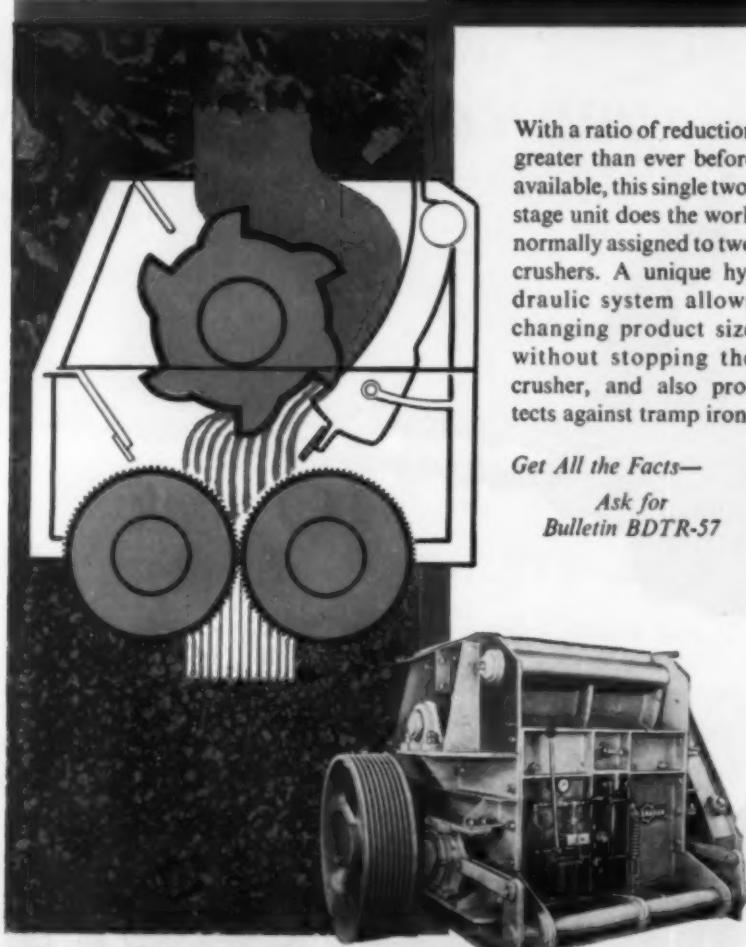
HENDRIX MANUFACTURING CO., Inc.
MANSFIELD, LOUISIANA



HIGHER ARCH · WIDER FRONT · TAPERED BASKET · GREATER STRENGTH

CRUSH RUN-OF-MINE TO FINE SIZES

IN THIS
TWO STAGE
UNIT



The McLanahan Triple Roll Crusher is composed of two elements—a primary single roll crushing against curved crushing plate; and double roll secondary performing the final reduction.

McLANAHAN

TRIPLE ROLL CRUSHER

Equipment News (Continued)

tion photos and diagrams, Iron Fireman Mfg. Co., 3170 W. 10th St., Cleveland 11, Ohio.

METAL DRAINAGE—Six-page bulletin features facts on metal drainage structures. Contains data on products, sizes, gages, weights and loading, with tables and illustrations. Product Information Service, Armclo Drainage & Metal Products, Inc., Middletown, Ohio. Ask for CMS-10258.

FLOTATION EQUIPMENT—New booklet available from Wemco describes flotation equipment; also discusses principles of flotation process for selectively separating finely divided mineral particles as well as design, construction and operating characteristics of the Wemco Fagergren flotation cell. Write to Wemco, Div. of Western Machinery Co., 650 Fifth St., San Francisco, Cal.

BATTERY PLATE—Bulletin GB-1876 from Industrial Div. of Gould-National Batteries, Inc., offer data on Silconic battery plate. It describes Gould process for introducing arsenic and silver cobalt sulphates into active materials of positive plates, producing batteries said to have 10 to 25% longer life and improved characteristics. Gould-National Batteries, Trenton 7, N. J.

WIRE ROPE—Blue Book of wire rope is 190-page brochure with finger-tip index. Extensive information on Lang Lay and Regular Lay, "preeming," inspection, correct spooling, maintenance, etc. Free to wire rope users, you get it by asking for G-16 Blue Book, Macwhye Wire Rope Co., Kenosha, Wis.

RIMS, WHEELS—Picture-filled catalog gives information and engineering data on Goodyear rims, wheels, tools and rim accessories. Discusses step by step procedure for mounting and demounting rims, gives operating instructions for hydraulic tools and discusses rim research. Write to Metal Products Div., Goodyear Tire & Rubber Co., Akron 16, Ohio.

SHEATHED CABLE—Colorful, detailed catalog for C-L-X sheathed cable describes construction features and gives engineering data and test results. Other features are applications, typical diameters and ordering information. For copies write to Simplex Wire & Cable Co., Cambridge 39, Mass.

SAFETY CAPS—Descriptive pamphlet shows and discusses Skullgard hats and caps for protection against impact and penetration. Hats feature "fixed-crown" suspensions for proper clearance between head and shell, come in nine

The big advantages of Taper-Lock mounting are now available for practically all of your sprocket installations. Below is listed the new wide range of types and sizes offered by Dodge!

This important expansion of the Dodge line is the result of the enormous popularity of the Taper-Lock idea. Taper-Lock Sprockets are *modern*. Industry likes them because they go straight from shelf to shaft without

machining—saving time. They are “easy on—easy off”—saving work. Their bushings can be re-used, not only in replacement sprockets, but in sprockets of different sizes and also in Taper-Lock Sheaves, Couplings, Conveyor Pulleys. Taper-Lock saves inventory—and money!

Dodge Taper-Lock Sprockets and Dodge Roller Chain are available through your local Dodge Distributor. Call him. Or write us for bulletin.



No Reboring!
No Keyseating!
No Waiting!



● **DOUBLE PITCH CHAIN and SPROCKETS**

Transmission Series (No. 2040 to 2080) and Conveyor Series (No. 2040 to 2100). Sprockets to 112 teeth—including, for the first time, stock sprockets of 17, 19, 21, 23, 25 and 35 teeth *made especially for double pitch chain*. Introduced by Dodge, these sprockets are designed for even distribution of tooth engagement and absolute accuracy of mesh. Wear is reduced by half. Life of chain and sprocket is doubled!

● **PLATE SPROCKETS**

Steel Plate, Type A. No. 35 to 120. Mandrel bore, bored-to-size or Taper-Lock.

● **SINGLE STRAND CHAIN and SPROCKETS**

No. 35 to 160. Sprockets to 112 teeth.

● **DOUBLE STRAND CHAIN and SPROCKETS**

No. 35-2 to 80-2. Sprockets to 112 teeth.

● **STANDARD ATTACHMENTS**

ALL TO ASA STANDARDS

DODGE MANUFACTURING CORPORATION, 3000 Union Street, Mishawaka, Indiana

A NEW PLANT

...for the **WEIRS CREEK COMPANY**



Designed, Engineered and Built by

Roberts & Schaefer

When you plan a new coal cleaning plant, you'll find it pays to talk with Roberts & Schaefer. What's your problem: a complete new plant . . . installation of new facilities . . . or a complicated dismantling, moving and rebuilding job? Whatever your requirements, Roberts & Schaefer will deliver a plant with the capacity, flexibility, efficiency and operating economy you need. R&S service is as comprehensive as you want it: initial process studies . . . structural, mechanical and electrical engineering design . . . installation of all facilities . . . and complete construction.



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**THE NEW
WEIRS CREEK COMPANY
SHAMROCK MINE**

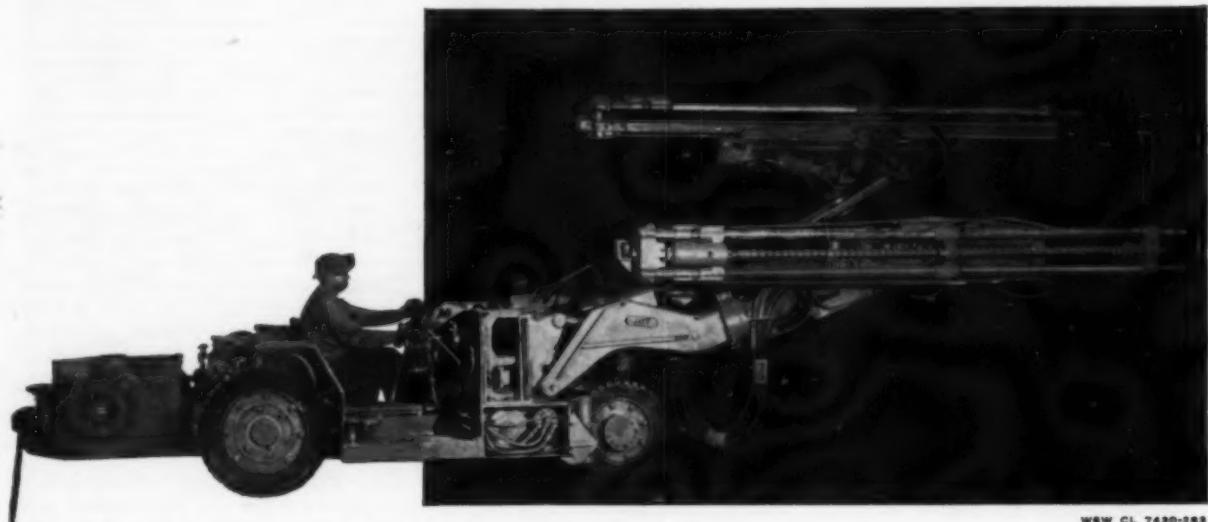
This is a jig plant near Providence, Kentucky, which is designed to wash 500 TPH of West Kentucky coal, seams #9, 11 or 12. The ROM coal is weighed on a belt scale and then reduced to a minus 6" size by a Bradford Breaker. All of the coal is washed in a Baum-type jig and the middlings are re washed in a diaphragm jig. The fine coal is dried in a centrifugal dryer.

*It pays to talk with
Roberts & Schaefer*

ONE OPERATOR...TWO DRILLS...

12 FT. HOLES IN ONE MINUTE WITH THE

NEW JOY CD-43



WSW CL 7430-288

The newest Joy coal drill has two drills, but requires just one operator. And he never has to leave the control console at his seat.

The operator spots a hole by locking pick-points against the face, then starts drilling. While the drill penetrates to blasting depth, he positions the second unit, and starts it drilling. Convenient controls give him hydraulically powered mastery over all movements of the machine—positioning, drilling and tramping.

The basic drilling unit of the machine is the time-proved Joy CD-40 hydraulic auger drill. Simple and rugged, this drill

is fast—a hydraulic thrust of 1500-1800 lbs drills coal at speeds up to 12 feet per minute. Ten or twelve foot feed eliminates stopping for auger changes. The auger is one piece, machined from solid bar stock, and heat-treated for long life.

For high seam or medium-high seam operation, the CD-43 reaches from 4" to 10'6" from the bottom, and reaches 21' horizontally across the face without moving the machine.

The result—faster rounds with a much faster drilling cycle to keep up with other high-speed equipment. Ask your Joy engineer all about the one-man CD-43.

Write for
Bulletin 283-1



EQUIPMENT FOR MINING...FOR ALL INDUSTRY

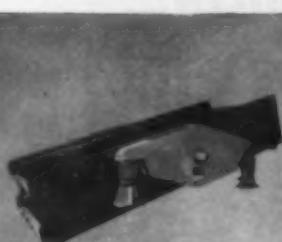


JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company
(Canada) Limited, Galt, Ontario

THE RIGHT SCREEN FOR YOUR JOB!



VIBREX



ELIPTEX



GYREX



hi-G

**ONLY H-R
MAKES ALL 4**

Are you faced with a really tough problem in sizing . . . scalping . . . washing . . . rescreening . . . dewatering? The right Hewitt-Robins screen is your answer!

Vibrex: Here's the most versatile screen of them all! Simple, field adjustable, stroke, speed, angle to match any requirement . . . circle-throw principle with two massive self-aligning bearings . . . rock-bottom economy coupled with long-life ruggedness!

Elliptex: Exclusive elliptical motion for horizontal operation gives high capacity, fast material progression, and sharp sizing.

Gyrex: This positive-stroke, four-bearing, circle-throw screen has an unsurpassed record for stamina.

hi-G: A modified-resonant unit that has the extra kick for hard-to-screen materials at only a fraction of usual power requirements. Both decks are accessible for cloth changes.

All 4 in standard *suspended* and *base mounted* models!

Whatever your specific screening problems, you will find one of these Hewitt-Robins units *best* fitted for the job. For information or service, contact your local H-R representative, or Hewitt-Robins, Stamford, Connecticut.



HEWITT-ROBINS

CONVEYOR BELTING AND IDLERS . . . POWER TRANSMISSION DRIVES
INDUSTRIAL HOSE . . . VIBRATING CONVEYORS, SCREENS & SHAKEOUTS

H-R Product Manufacturing Plants in Buffalo, N.Y. • Chicago, Ill. • King of Prussia, Pa. • Passaic, N.J.
Amsterdam, Holland • Johannesburg, South Africa • London, England • Montreal, Canada • Paris, France

Equipment News (Continued)

colors for quick personnel identification. Ask for Bulletin No. 0601-4, Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh, Pa.

WELDIRECTORY—Bulletin 7000.2 is a 20-p catalog of Lincoln manual arc welding electrodes for hardsurfacing and welding stainless steel, non-ferrous metals and cast iron. It describes each electrode, properties and applications. Charts aid electrode selection and identification and give welding-machine settings. Write to Lincoln Electric Co., Cleveland 17, Ohio.

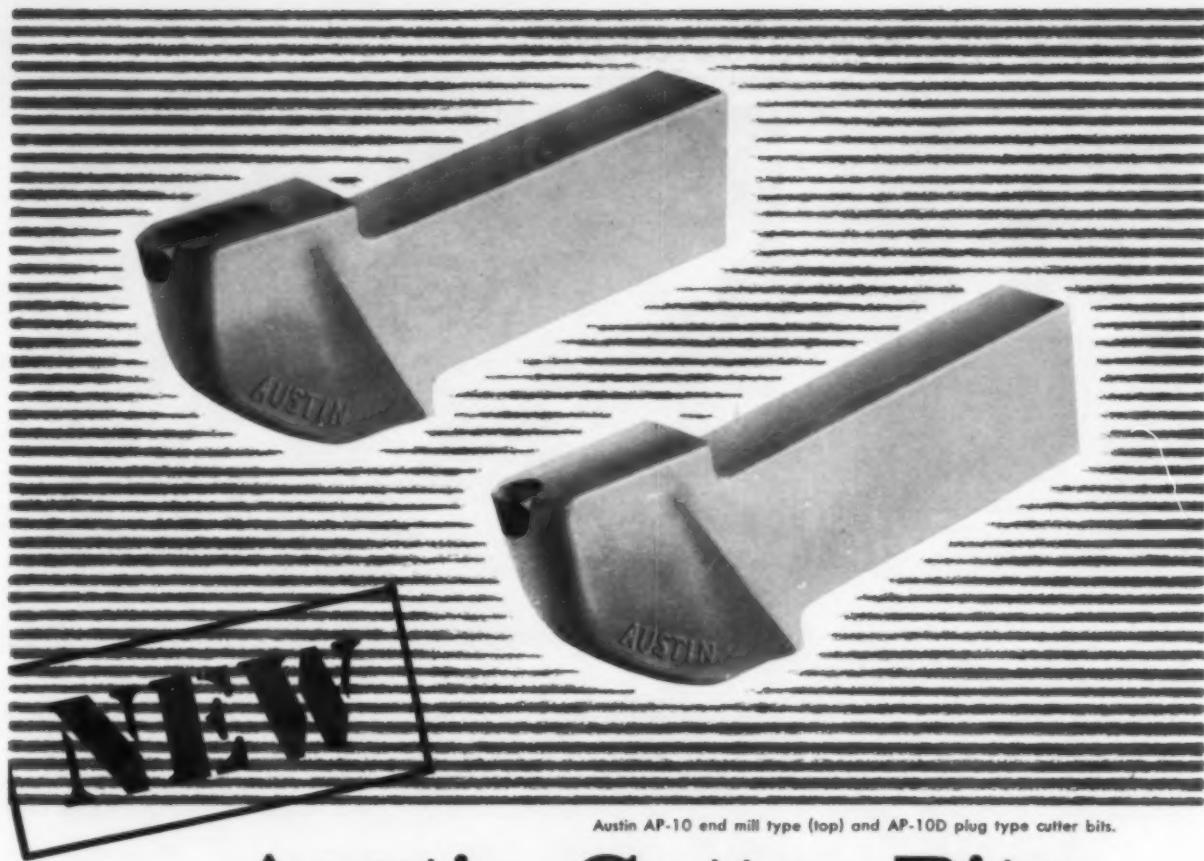
GRADERS, ROLLERS—Folder HWG-561 outlines features of nine motor-grader models ranging from 75 to 195 hp. Covers complete line of tandem and three-wheel rollers and M-52 Maintainer that performs maintenance jobs. For copy write to Huber-Warco Co., Marion, Ohio.

CIRCUIT BREAKERS—New bulletin aids in selecting molded-case circuit breakers and enclosures. It presents construction and performance features, ratings and details on I-T-E breakers with ratings of 10 to 800 amps and on enclosures for these breakers in NEMA 1 through NEMA 12 classifications. Write for Bulletin No. 5004-1A, I-T-E Circuit Breaker Co., 1900 Hamilton St., Philadelphia 30, Pa.

CONVEYORS—Custom engineered belt conveyors at low cost are described in a 4-p bulletin published by the Western Machinery Co., Industrial Sales Div., 650 Fifth Ave., San Francisco 7, Cal. It also has data on how to estimate conveyor requirements including capacity charts, recommended belt speeds, horsepower requirements, maximum angles of inclination and required conveyor lengths.

CONTINUOUS MINERS—Modifications of the Joy 5CM continuous miner including integral bolting drills and gathering arm cleanup are described and illustrated in a new specification sheet available from Joy Mfg. Co., Pittsburgh 22, Pa. Complete specifications on the miner plus rigid and tilting roof drills are included. According to Joy, integral roof-bolting drills are a unique feature on miners as low as the 5CM.

PUMPS—Peerless Type A pumps are described in a new bulletin from the Peerless Pump Div., Food Machinery and Chemical Corp., Los Angeles 31, Cal. The pumps, say the firm, can handle up to 70,000 gpm of water and non-abrasive liquids.



Austin AP-10 end mill type (top) and AP-10D plug type cutter bits.

Austin Cutter Bits reduce mining costs

New AP-10 end mill and AP-10D plug type cutter bits are precision manufactured by Austin Powder to penetrate faster . . . last longer . . . reduce mining costs.

Carbide inserts are brazed in special alloy steel shanks to assure strongest possible support. As a result, tool failure, due to tip loss, is virtually eliminated even under most severe cutting conditions. This assures more production time, less time lost in bit changes.

Your Austin representative will gladly show you how these and other features of AP bits can improve your operations. Call him today! AA-6925



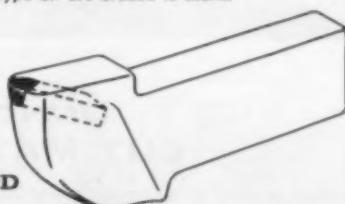
AUSTIN
POWDER COMPANY
CLEVELAND 13, OHIO

**Maximum carbide support
slashes tip loss**



AP-10

Three sides and extreme end of carbide insert in Austin end mill type bit are brazed to shank.



AP-10D

Entire surface of carbide insert in Austin plug type bit with exception of cutting edge is brazed to shank.

Bellaire, O. Brookville, Pa. Chapmanville, W. Va. Charleston, W. Va. Coaldale, W. Va. Evansville, Ind. Grundy, Va.
Hazard, Ky. Madisonville, Ky. Masontown, W. Va. Matewan, W. Va. Mt. Hope, W. Va. Waynesburg, Pa.

Among the Manufacturers



P&H IN 1848 . . . small metal-working shop.



Anniversary Year

Harnischfeger Corp., major producer of cranes, power shovels, hoist and welders, is celebrating its 75th year of operation in 1959.

Headquartered in Milwaukee, Wis.,

P&H TODAY . . . a huge corporation aiming for a \$100 million business.

it has grown from a small metal working shop, established in 1848 by Alonso Pawling and Henry Harnischfeger, to a huge corporation that did a gross business of \$87 million in 1957, with

operations on five continents. Though known nationally as Harnischfeger Corp., it still retains the original "Pawling & Harnischfeger" or P&H trademark on its products, helping to keep



Freely oscillating vibro-feeder, 2 x 15 ft, for bituminous coal, serving as bin bottom and feed element to belt conveyor. Feeders of this type are available with capacities to 600/800 tph.

Dravo-Schenck Vibro-Feeders CUT MATERIALS HANDLING COSTS

Because it is built to stand up under the punishment that hot, abrasive or other hard-to-handle materials deal out, Dravo-Schenck vibro equipment keeps maintenance costs down. All wearing parts are ruggedly built, and the unique "Micro-Thrust" exciter unit reduces wear by moving material with minimum contact with troughs or screens.

Cost-cutting, heavy-duty Dravo-Schenck screens, conveyors and feeders are at work in a wide variety of applications—handling such difficult materials as coal, ferrous

and non-ferrous ores, sinter, chemicals, cement clinker, and crushed stone.

Our engineers will gladly work with you on specific problems. For information, write for Bulletin No. 1475, Dravo Corporation, Pittsburgh 22, Pennsylvania.

DAV
CORPORATION

FOUR CONVENIENT SUPPLY POINTS



nearby supply... for the coal fields!

- ① **CONVENIENT SUPPLY POINTS.** Large refining and storage facilities located near the coal fields assure uninterrupted supplies of Ashland Permatreat coal spray oil for immediate delivery by tank car or transport truck.
- ② **WEATHERPROOF.** Coal sprayed with Permatreat becomes weatherproof, dustproof, waterproof, windproof and non-corrosive. Resists freezing, eliminates frozen car pockets.
- ③ **REFINERY-CONTROLLED QUALITY.** With Ashland Permatreat, you're assured of product uniformity. Permatreat is quality controlled and carefully refined to meet the needs of your operation.
- ④ **TECHNICAL AND RESEARCH SERVICE.** Helpful technical and research services are available to you from our nationally recognized specialists in oil treating of coal.

ONE Permatreat MENT LASTS THE LIFE OF THE COAL!

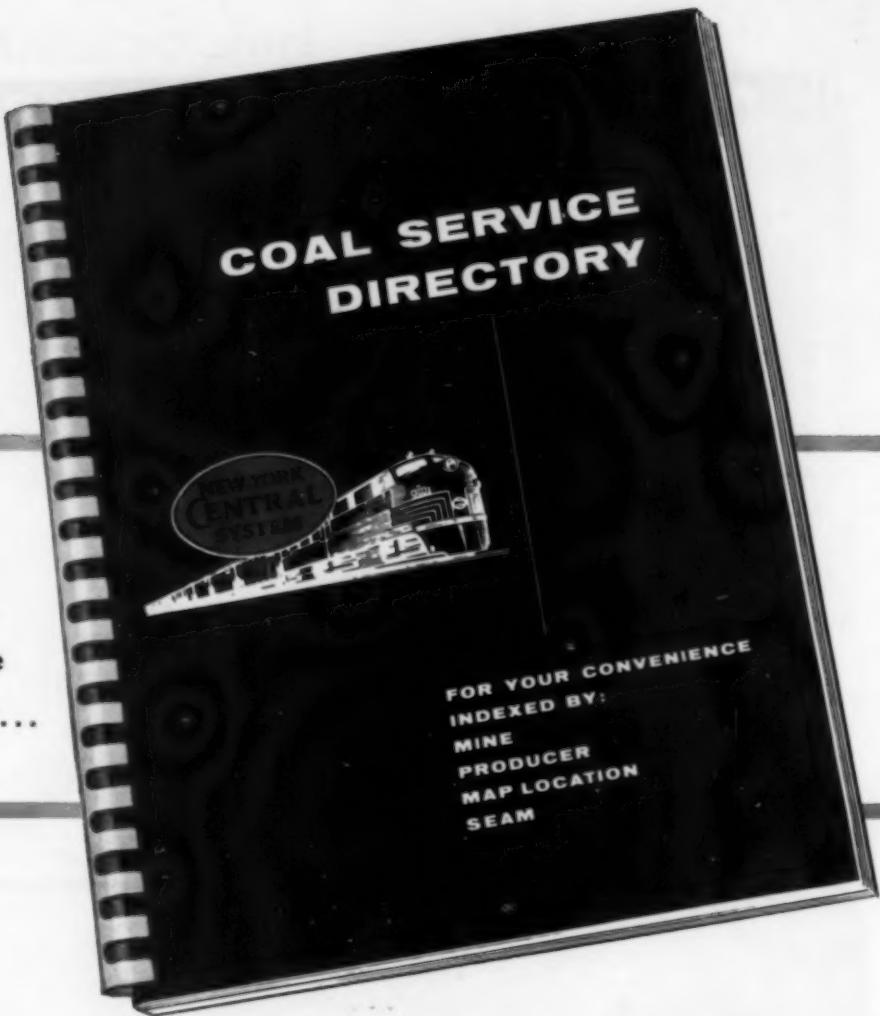
For immediate service call the Ashland Oil Sales office nearest you:

Ashland Ky., EAst 4-1111
 Beckley, W. Va., CLifford 3-6687 Kuttawa, Ky., Phone 5501
 Canton, O., GReenwood 7-4565 Louisville, Ky., SPring 6-4631
 Columbus, O., AMherst 8-9419 Pittsburgh, Pa., FRemont 1-7314

ASHLAND OIL & REFINING COMPANY, Ashland, Kentucky



A wealth
of information
for you from the
New York Central...



New Coal Service Directory

Here's another example of how New York Central's technically trained Coal Sales Department staff can help coal users.

If you use or contemplate using coal, you will be interested in the factual information included in this new Coal Service Directory.

Never before has so much basic data on mines, producers, seams, map locations been assembled under a single cover for the twelve major coal-producing areas located along the New York Central lines.

This new guide quickly identifies and locates any source or type of coal needed by name of mine and/or pro-

ducing company. An individual map for each of the coal-producing areas features a handy grid reference system which helps you locate any mine at a glance! Each of these maps is followed by a brief description of the coals produced in the area, including characteristics and uses for which they are most suitable.

New York Central's Coal Sales Managers are always on call to help you get the most for your coal dollar.

For assistance or for information about the new Coal Service Directory, call or write your nearest New York Central Coal Sales Department representative.

NEW YORK CENTRAL SYSTEM'S COAL SALES DEPARTMENT

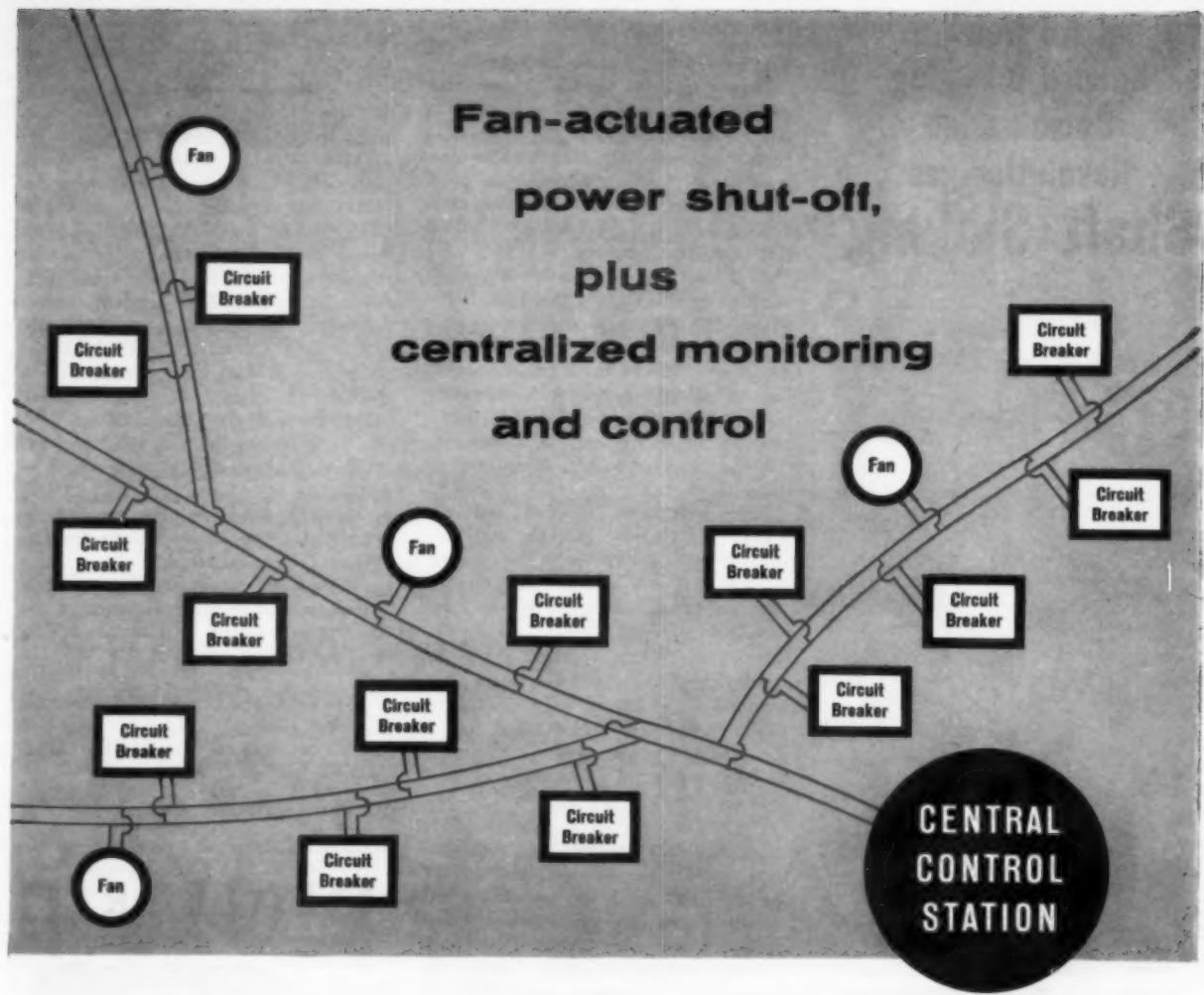
Director of Coal Sales—
H. L. Willard . . New York

Fuel Engineer—
H. A. Klester . . New York

Coal Sales Managers:
Chicago . . A. W. Behrens
Cincinnati . . G. W. Childers
Cleveland . . P. P. Belitz
Detroit . . G. E. Wheeler
New York . . A. A. Cincas
Pittsburgh . . R. E. Rogers

New York Central Railroad

February, 1959 • COAL AGE



...over a single pair of wires

Here's what this new FEMCO system provides:

1. **Automatic shut-off** of power going into the mine, in the event of fan failure.
2. **Centralized monitoring** of all fans and circuit breakers.
3. **Selective remote control** of circuit breakers.

Any number of fans and circuit breakers, in any combination, can be handled over a single pair of wires in the mine or on the surface.

Fan monitoring is continuous. Two indications for each fan are provided, one showing that fan pressure is normal, the other showing fan speed. Loss of pressure at any fan automatically shuts off all power to the mine after a predetermined interval from 0 to 30 minutes. It

also sounds an alarm, at the office, which continues until silenced. Monitoring of circuit breakers is on a programmed basis.

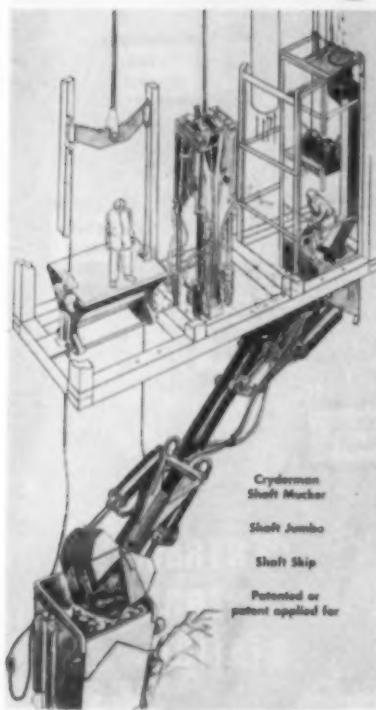
The time-saving advantages of this system are obvious. Fan monitoring permits instant identification of the fan which is malfunctioning, and centralized control of circuit breakers makes it possible to restore power at all locations in less time than it would take a man to reach any one of them.

Femco Monitoring and Control Systems are now in operation in a number of leading coal mines, and more installations are being made each month. For full information, write to FEMCO, INC., IRWIN, PA. We will be glad to discuss your specific requirements.

Femco

COMMUNICATION AND CONTROL SYSTEMS FOR MODERN MINING

All New Record Breaking Combination Revolutionizes Shaft Sinking



Cryderman Shaft Mucker

The highly maneuverable CRYDERMAN Shaft Mucker, requires only one man to operate and is the one machine that will handle both vertical and incline shafts. A collapsible shaft jumbo accomplishes the drilling in record time and a fast-action tilt-dump safety skip completes the smooth working cycle of operations. Exclusively a CRYDERMAN creation, from custom design to finished products, this rugged equipment is your best assurance of low-cost operation. CRYDERMAN equipment recently sank 24-feet of shaft in 24-hours.

Check with us on your coal mining problems. We provide original ideas and custom equipment for special projects.

Machinery Center, Inc.

1201 So. 6th West—HUnter 4-7601
Salt Lake City, Utah

Shaft & Development Machines, Inc.

808 Newhouse Bldg.—EM 3-5373
Salt Lake City, Utah

Manufacturers (Continued)

alive the firm's history and tradition.

Regarding the firm's tremendous growth, Mr. Harnischfeger said entering this anniversary year: "Seventy-five years represents only one thing to us—a milestone at which we pause to point up the strengths we gained for even greater progress in the next 75 yr." To this end, the company has plans for new products or product improvements in virtually all its major divisions. Highlights of the program include: four or five new excavator models soon to be out; a new line of truck cranes; a new line of electric hoists with capacities from 250 lb to 5 tons; addition of a new line of V-type loop scavenger models to the company's diesel engine line.

"Our continuous research and development programs plus the introduction of new products now being considered, promises a bright horizon and entrance into new markets in the foreseeable future."

Allegheny Ludlum Steel Corp. has announced appointment of C. F. Gharst Supply Co., Terre Haute, Ind., as a new Carmet mining tool distributor.

Carmet Div. of Allegheny Ludlum is located in Ferndale, Mich.

Sprague & Henwood Inc., manufacturer of drilling equipment, has reported the formation of a new, wholly-owned subsidiary, Sprague & Henwood International Corp.

It will handle all export business of Sprague & Henwood Inc., formerly handled by Philips Export Co. Paul Mertzweiler, former manager of the Machinery Dept. of Philips Export, was elected secretary of the new firm and will be responsible for developing, promoting and servicing Sprague & Henwood equipment outside the United States.

Kennecott Wire & Cable Co. has become an operating division of Okonite Co., subsidiary of Kennecott Copper Corp., Pasaic, N.J.

The move to combine the two operations was made to perform a more effective job of competing in the wire and cable industry, said R. Stuart Kefer, Okonite president. Kennecott Wire & Cable Co. will be known as the Okonite Co., Kennecott Wire & Cable Div.

Eaton Mfg. Co. will acquire the assets and business of Cleveland Worm & Gear Co. and its subsidiary, Farval Corp., according to reports.

Upon completion of an exchange of stock, Cleveland Worm & Gear will be operated as a wholly-owned subsidiary of Eaton. Eaton states that the

acquisition is part of a long-range plan of diversification.

The corporate name of Cardox Corp. is now Airdox Cardox Products Co., Inc., Indianapolis, Ind.

Airdox Cardox Products Co. produces and sells equipment and systems for nonexplosive mining as well as augers and drilling machines. The following have been named officers of Airdox Cardox: David M. Klausmeyer, president; Clarence H. Caughey, executive vice president and general manager; Paul C. Manley, vice president in charge of sales for mining activities; Richard J. Bailey, general manager, High Pressure Pneumatics Div.; John C. Ross, comptroller and treasurer; and William P. Nottingham, secretary.

David J. Davis has been named director of sales and advertising for Gar Wood Industries, Inc.

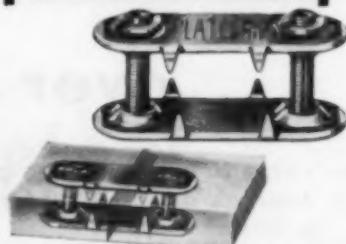
Mr. Davis, experienced in the construction and the truck-equipment industry, will handle all Gar Wood sales and marketing activities.

George Ramsden has been appointed assistant general manager for Link-Belt Co.'s N. Central Div., with headquarters in Minneapolis.

Mr. Ramsden has been a mining sales

PLATEGRIP

PLATE FASTENERS FOR CONVEYOR BELTS



Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allows natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from 1/4" to 1 1/2" thickness. Write for Catalog Sheet.



ARMSTRONG BRAY & CO.
5340 Northwest Highway, CHICAGO 30, U.S.A.

How Farval lubrication saves labor, eliminates bearing troubles on power shovels

FARVAL—
Studies in
Centralized
Lubrication
No. 156

WATCH a power shovel tear into rock, slate, gravel, or dirt. It's dig, hoist, swing, dump—over and over again, hour after hour, day after day. Work like this soon ruins improperly lubricated bearings. That's why it pays to install the Farval Centralized System of Lubrication on quarry and mine shovels like the one shown.

It takes just a minute or two, even on a big six-yard shovel like the Bucyrus-Erie 150-B, for Farval to lubricate every bearing needing protection for heavy duty. Compare this to stopping the shovel for 15 to 20 minutes each time the operator needs to lubricate by hand—and then he has to climb around looking for grease fittings.

FARVAL FIGHTS FRICTION

Farval delivers any oil or grease that can be pumped under pressure to any number of bearings from one central station, in exact quantities, as often as desired. The rugged Farval valve has only two moving parts—is simple and sure. No uncertain springs, ball-checks or pinhole ports to cause trouble. Any grit, abrasive sand or dust that has penetrated the bearings is forced out by the measured injections of lubricant, and the lubricant forms a protective seal. Hazards due to hit-and-miss hand lubrication are eliminated.

FARVAL SAVES MAN HOURS, LUBRICANT

Experience shows that Farval saves as much as 45 minutes of each hour of oiling labor—up to 3 of every 4 pounds of lubricant consumed by other methods.

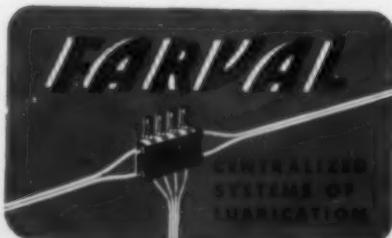
If you make or use power shovels, conveyors, crushers, shaker screens, elevators or other heavy equipment, your machines will run longer and produce more if you install Farval. Farval protects millions of bearings throughout industry. Write now for Bulletin 26. The Farval Corporation, 3288 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.



KEYS TO ADEQUATE LUBRICATION—Wherever you see the sign of Farval—the familiar valve manifolds, dual lubricant lines and central pumping station—you know a machine will be properly lubricated. Farval manually operated and automatic systems protect millions of industrial bearings.

Pictured is the Farval-lubricated truck frame of a Model 150-B six cubic yard power shovel. Photo courtesy of Bucyrus-Erie Company.





How to beat off corrosion attack!

Corrosion attack is a 24-hour battle in every mine. But, you can take the fight out of those trouble-making chemicals by installing USS National Polyethylene Pipe. It's the best pipe for mine drainage problems, because National Polyethylene Pipe is *tough*; it is unharmed by deadly corrosive mine water, acids, alkalies, salts, and other mine chemicals.

USS National Polyethylene Pipe is light, flexible and easy to handle. And it can take plenty of rough handling. Polyethylene Pipe performs efficiently in a temperature range of -90°F. to $+120^{\circ}\text{F.}$, and it won't crack or break in sub-zero weather.

And remember this: National Polyethylene Pipe eliminates the need for replacement pipe —*it's made to last*. You save money, because Polyethylene Pipe is the most economical pipe that can be used for mine drainage.

USS National Polyethylene Pipe is available in sizes from $\frac{1}{2}$ inch to 6 inches in diameter, and in a variety of wall thicknesses. For complete information, write to National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS and *National* are registered trademarks



This seal of the National Sanitation Foundation means Tested . . . Approved . . . Sanitary!



USS National
Polyethylene Pipe

*"The world's largest and most experienced manufacturer
of tubular products"*



**National Tube
Division of
United States Steel**

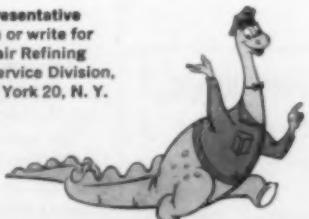
Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York



Valves... Oil... and How to Save Money

Valves which open and close hundreds of times a minute can cause lost money, time and power when deposits and wear start to take their toll. Sinclair Tenol® Oils fight deposits and wear—help keep vital parts working longer without repair. Refill with Tenol now. Next time management asks how you've cut costs, tell them you've switched to Sinclair— and show them the results.

Call your Sinclair Representative
for further information or write for
free literature to Sinclair Refining
Company, Technical Service Division,
600 Fifth Avenue, New York 20, N. Y.
There's no obligation.

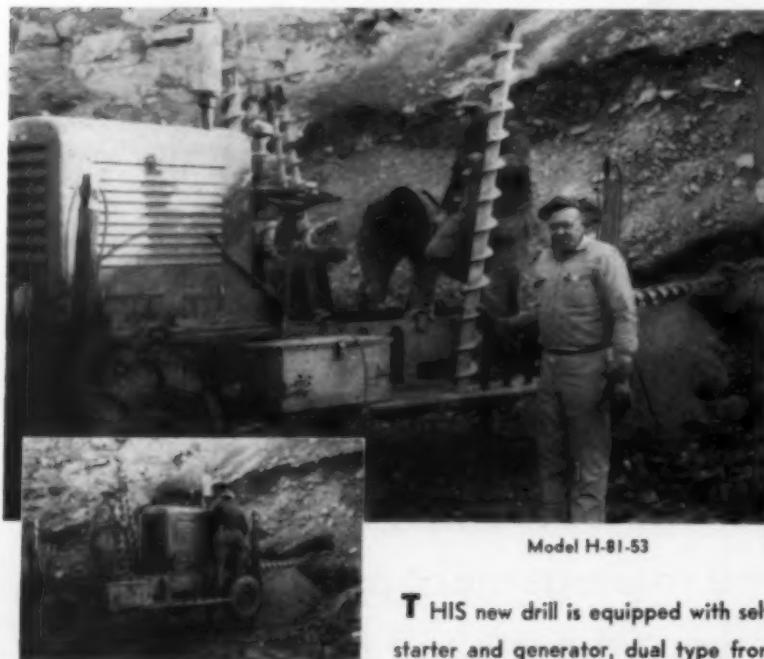


SINCLAIR Tenol® Oils

HOW THE **Parmanco** H 81-53 HORIZONTAL DRILL *Performs* AT TRUAX-TRAER RED EMBER MINE

Example:

5 MINUTES SET UP TIME
15 MINUTES TO DRILL 60 FT. HORIZONTAL HOLE



Model H-81-53

COMPLETELY REDESIGNED:

• All hydraulic feed. Powered by 106 H.P. engine • Four individually adjusted hydraulic jacks • Drills 5" - 6" - 8" holes to 100 feet or more • Greater drilling speed • Faster auger retrieving • Fast reverse for drilling and cleaning of hole • Accuracy and mobility

USE COUPON . . . Send for complete details

PARIS MANUFACTURING CO.

PARIS, ILLINOIS

Send details on Model H81-53 Send details on complete line

Name _____

Company _____

City _____

State _____

Manufacturers (Continued)

specialist since 1955 and has been with Link-Belt since his graduation from Lehigh University in 1947.

C. J. Moore takes over in the new job of general sales and marketing manager for Exide Industrial Div. of The Electric Storage Battery Co., and in the newly created position of marketing manager will be Thomas E. Peacock.

Mr. Moore has been Exide's sales manager for the last 5 yr and now assumes responsibility for the firm's national sales and marketing activities. Mr. Peacock will be responsible to Mr. Moore for advertising, sales promotion, market research, service engineering, and has over-all charge of equipment sales in all markets.

K. R. Chandler steps up from assistant sales manager to the new post of assistant vice president of sales for Koehring Div. of Koehring Co., and William B. Dickerson becomes sales manager for the firm.

Mr. Chandler, with Koehring since 1948, studied civil engineering at the University of Wisconsin. He will supervise the sales office, Parts Dept. and Service Dept., as well as new product activities. Mr. Dickerson will be responsible for all field sales personnel.

Youngstown Sheet & Tube Co. has announced new assignments in the Sales Dept.

Robert Walling is the new manager of "Yoloy" sales, Roy A. Curl is manager of sales promotion and advertising, and Robert B. Davidson is assistant manager, "Yoloy" sales. Other appointments are: Oscar H. Reuter, assistant manager, standard pipe sales; Robert K. Stephens, assistant manager, carbon bar, rod and wire sales. Frank A. Anderson, district sales manager, St. Louis; and William E. Fender, assistant district sales manager, Indianapolis.

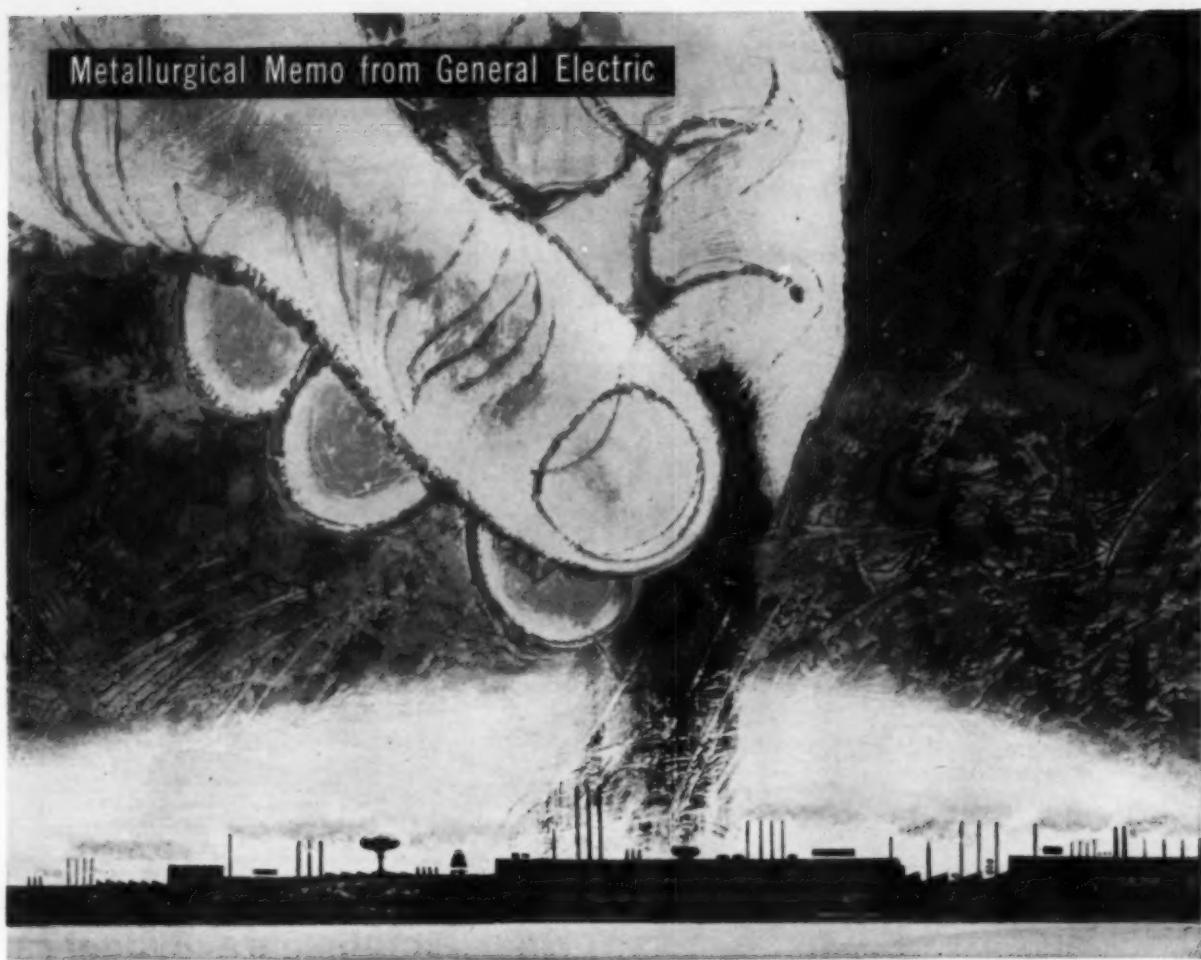
J. Gregory Tierney has been named sales representative in the Indiana, southern Illinois and western Kentucky territory for Leschen Wire Rope Div., H. K. Porter Co., Inc.

Mr. Tierney has been with the City Engineers Dept. of Indianapolis, Ind., as superintendent of maintenance for the Board of Flood Control Commissioners, and has a background in heavy construction equipment.

Alexander S. Basil was made vice president in charge of manufacturing for Rockbestos Products Corp.

He moves up from the position of works manager which he has held since joining Rockbestos in July, 1957, following more than 30 yr with the U. S. Rubber Co.

Metallurgical Memo from General Electric



How a pinch of powder cuts coal mining waste

Metallurgical Products Department reports on
Carboloy® cemented carbides . . . and on quality controls that make
Carboloy carbides more resistant to wear and impact

Carbides are metal powders. Cemented and tipped on mining tools, they wear up to 50 times longer than steel.

But outstanding performance must start with carbide of high purity and consistent metallurgical quality. That's why every step in the manufacture of Carboloy cemented carbide is checked and analyzed in our \$250,000 Quality Control Laboratory. Its job is to make sure that every Carboloy mining tool is tipped with the highest quality carbide possible.

The complete line is stocked by your local Authorized Carboloy Mining Tool Distributor. Call him, or write: Metallurgical Products Department, General Electric Company, 11120 E. 8 Mile Ave., Detroit 32, Michigan.

CARBOLOY® CEMENTED CARBIDES

CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS • MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

METALLURGICAL
PRODUCTS DEPARTMENT
GENERAL  ELECTRIC

Bolt soft mine roofs Safely... use PATTIN'S

REVOLUTIONARY *AIR-SEAL RESIN PROCESS

CHECK THESE FEATURES —

- Resin penetrates soft shale around expansion shell, seals out air and prevents crumbling of sidewalls where shell is anchored
- Binds shell and strata together into one solid mass at anchoring end of bolt.

- Absolutely permanent anchorage — impervious to oxidation, water, oil, gas or acids. Ideal for haulageways and airways which must remain open for many years
- Extremely strong adhesion value, even on wet surfaces — high tensile and compression strength.

- Resin is pre-packaged in convenient container — no spilling—no contact with workman • No special tools or equipment are required for its use.

Write for details
and demonstration!

*U. S. Pat. No. 2,829,502. Other patents pending in the U. S. and foreign countries.

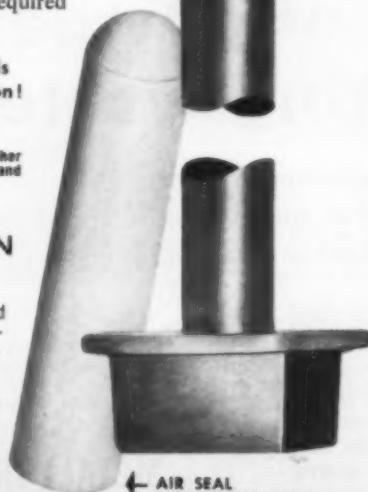
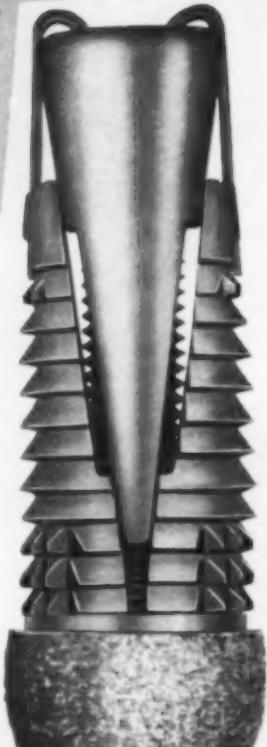
IN WESTERN STATES

Pattin expansion shells and Air-Seal process are available and serviced exclusively by The Colorado Fuel and Iron Corp., Denver, Colorado. Western mining companies should contact them direct for information and consultation.



PATTIN
MANUFACTURING COMPANY
MARIETTA, OHIO

The PIONEER of roof bolting... established 1888



A typical experience in the work-a-day lives of thousands of industries.

BOGONE IT, PETE, THIS HAS GOT TO STOP!

Just came from the buying department... Not a man wearing a respirator.

I'm not surprised, Jim. The men would rather breathe dust than wear heavy old respirators.

I know it. But I'm supposed to enforce safety rules. Oh, for a light, comfortable dust mask!

Seen Purchasing yet? They're up on new developments.

Here's what you want, men—The Flex-A-Foam Dust Mask—light as a feather!

It should. It filters non-toxic dust particles 100 times smaller than you can actually see.

Order a trial dozen, Bob. Maybe they'll wear these without continual prodding.

They're glad to wear Flex-A-Foam Dust Masks. Our troubles are over!

LATER

You're right! We should now equip the entire plant!

Try low-cost FLEX-A-FOAM and judge proof by performance.

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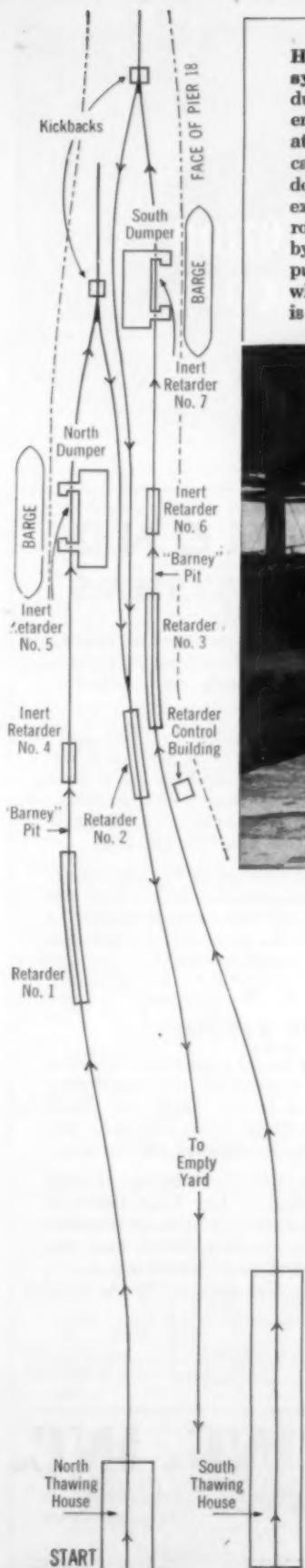
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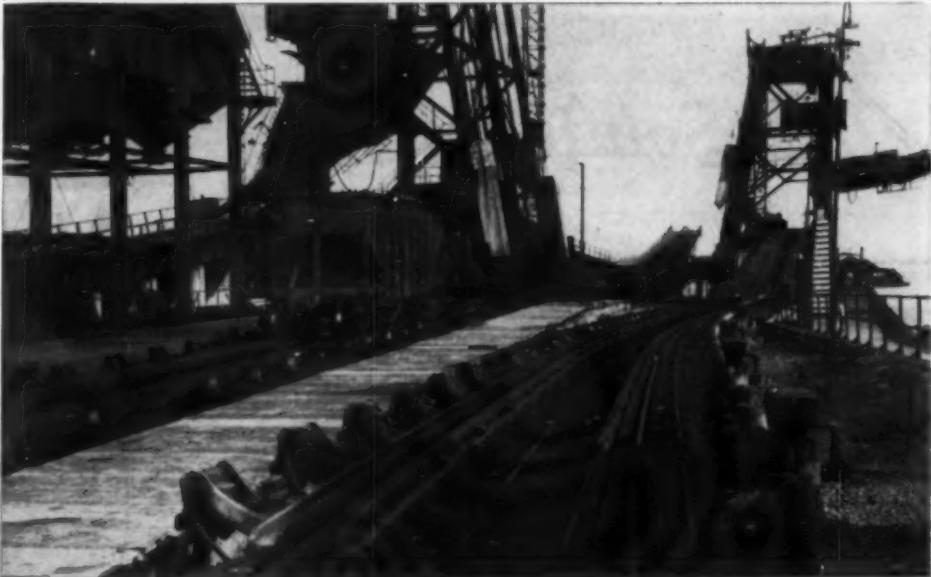
You can save headaches and money too on repairs to underground machinery by using KELLY parts. They last longer! Fully guaranteed and product insured.

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How the new UNION car-retarder system works — Pier 18 has two coal dumping systems and both use the same empty yard. Following through the operation of the North dumper, a loaded coal car leaves the North thawing house, rolls down an incline to retarder No. 1 where its exit speed is reduced, so that when the car rolls on to the "barney" pit, it is stopped by inert retarder No. 4. A "barney" then pushes the car up the slope to the dumper where it is stopped by retarder No. 5. Coal is then dumped into a barge.

The next full car pushes the empty car off the dumper. It goes by gravity through a kickback and spring-switch combination for return through retarder No. 2 to the empty yard. Controls for the power retarders and switches are incorporated in a control machine housed in a new tower building. One operator in this tower surveys the operation and operates the control machine. He has loudspeaker communication with the thawing sheds, the control cabins on the dumpers, and the yard office.



General view of North and South dumpers showing No. 2 and 3 retarders in foreground. Car entering retarder is going to the empty yard.

Fast, low-cost coal handling results from Automation at Pier 18

The Central Railroad of New Jersey recently modernized its coal dumping facilities at Pier 18, Jersey City, N. J. Now, one man sits in a tower, flicks a few levers, and controls loaded coal cars rolling by gravity to the dumpers and empty cars moving from the dumper to the empty yard. Formerly, this job required a crew of car riders and was a costly and hazardous operation.

Now, the job is handled quickly, safely and economically through a

system of UNION Electro-Pneumatic Car Retarders. Operating costs have been greatly reduced, and coal is promptly loaded for shipment by barge to New York and New England areas.

What is your materials handling problem? If it involves many car-loads of coal, ore or other products, let us show you what can be done with automatic car-retarder systems to increase efficiency and reduce costs. Write for information.

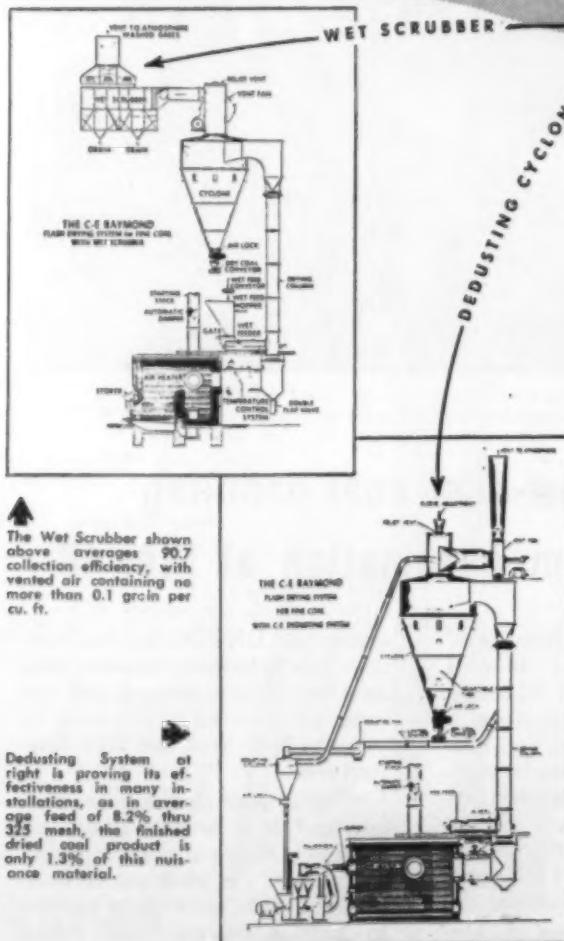
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- 1—Jeffrey 70 UR Cutter, rubber-tired, Universal head, low vein.
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- 2—Sullivan CR-10's, 15" high.

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- 16—Joy Loaders all types.
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- 1—Goodman 665 Loader, on carts.
- 1—Goodman 660 Loader, on carts.
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- 2—Myers Whealy No. 3 Automatic Loaders.
- 2—Clarkson Loaders, 26" above rail.

CONVEYORS

- 2—Joy 30' Underground Belt Conveyors, 500' to 2000' each. Excellent.
- 2—Goodman 97-C, 30' Conveyors, 1500' long.
- 1—Barber-Greene 30' Belt Conveyor, 350', Excellent.

CONVEYORS

- 2—Robins 30' Belt Conveyor, 500'.
- 1—Jeffrey 52-B, 26' Conveyor, 1200' each.
- 1—Jeffrey 52-B, 30' Drive and Tail Assembly, complete.
- 3—Robins 26' tandem drive Belt Conveyors, 1,000' to 2,000' long. Excellent condition.
- 2—Joy MTB 30' Drive and Tail Assembly, complete.
- 3—Goodman 97 HC 30' Drive and Tail Assemblies, complete.
- 8,000' Conveyor Belt, 30".
- 10,000' Conveyor Belt, 26", like new.
- 2—61EW Elevating Conveyors.
- 2—61WH 15' Room Conveyors, 300'.
- 2—Joy 15' Room Conveyors, 300'.
- 2—Joy 20' Conveyors, 300'.
- 4—Joy Ladel UN-17 Shakers.

CONVERTERS AND DIESEL PLANTS

- 2—Goodman G-12½ and G-15 Shakers.
- 100KW, G.E. TCC-6's, 275 volt, Rotary Converters.

CONVERTERS AND DIESEL PLANTS (Cont.)

- 1—150KW, G.E. HCC-6, 275 volt, Rotary Converter.
- 1—150KW, 6 phase, Allis Chalmers Rotary Converter, 275 DC.
- 1—200KW Allis Chalmers Rotary Converter, 6 phase, 275 DC, perfect.
- 1—200KW, G.E. HCC-6 Rotary Converter, 275 volt DC.
- 1—300KW, G.E. HCC-6 Rotary Converter, 275 DC.
- 2—300KW Westinghouse, 6 phase, Rotary Converters, 275 volt DC.
- 2—500KW Westinghouse Rotary Converters, 275 volt DC.
- 2—200KW Westinghouse Rotary Converters, 275 DC.
- (all the above with 6900/13000 and/or 2300/4000 primary transformers)
- 2—150KW MG Sets, General Electric and Westinghouse.
- 1—200KW MG Set, Westinghouse, rebuilt.
- 1—200KW MG Set, General Electric, perfect.
- 2—150KW Allis Chalmers MG Sets, 275 DC volt, excellent, 220-440 AC volt.
- 1—300KW Westinghouse, 600 volt MG Set, rebuilt.
- 2—300KW Westinghouse, 600 volt, 6 phase, Rotary Converters.
- 2—500KW Westinghouse, 600 volt, DC, 6 phase, Rotary Converters.
- 2—500KW HCC-6 Rotary Converters, 6 phase, 600 volt DC.
- 1—GMC-471 Diesel with 60KW, 250 volt DC Generator.
- 1—GMC-671 Diesel with 75KW, 250 volt DC Generator.
- 1—Cummins 125 KW, Diesel with 250 volt DC Generator.
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Extended Ends on each car catch coal that would otherwise fall between cars: the entire trip is loaded faster, without stopping the trip or the flow of coal pouring from the loading mechanism. Spillage between cars is eliminated. Haulage safety is increased.

Other special features included only in **QCF** drop-bottom mine cars:

- all-welded end sill members.
- double-action spring bumpers that cannot tip, flatten or crush.
- lubricated doors for easy, positive action with faster unloading.

Forty years of **QCF** experience in mine car design and manufacture back up the **QCF** Representative. He can give you full information on all sizes and types of mine car from 2 to 30 tons and larger. Why not discuss your haulage requirements with him? Just call your nearest **QCF** Sales Office.

*Bulletin describing all types of
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HIGHEST-LIFT single slope belt conveyor in the world is installed at Orient Mine No. 3 in southern Illinois. This Link-Belt slope conveyor operates on a 16° incline, has a vertical lift of 862 ft. in a horizontal distance of 3167 ft. Conveyor employs a 1500 hp drive and has a capacity of 1100 tph.

CUT YOUR "CARRYING COSTS"

60 IN. WIDE slope belt conveyor serves the Robena Mine in southwest Pennsylvania. This Link-Belt conveyor operates at 600 fpm and has a total lift of 170 ft. Carrying 3000 tph, it is one of the highest-capacity belt conveyors in the coal industry.

... take the low-cost route
for mine-to-plant coal handling:
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What's the most practical way to move coal from your mine? In your calculations on capacity, mine depth, lifting time and other factors—don't overlook these economies of Link-Belt slope belt conveyors:

COST—Low initial investment, low cost per ton handled.

CAPACITY—They're able to handle as great a tonnage as you could possibly produce.

OPERATION—Power demands are relatively light, maintenance is low . . . and, when required, inexpensive.

To learn why Link-Belt's experience in slope and horizontal belt conveyors means even further savings, get in touch with your nearest Link-Belt office. Have them deliver Book 2655.

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